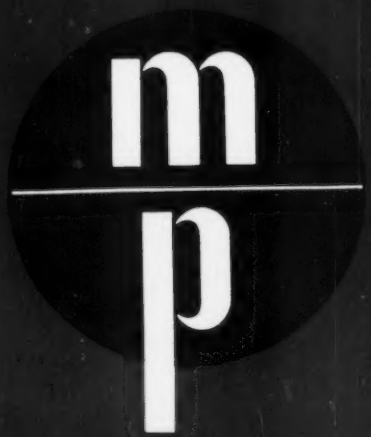
MODERN PLASTICS



AUGUST 1951

It pays to use your custom molder's know-how

which includes WARP-PREVENTION *in large parts*

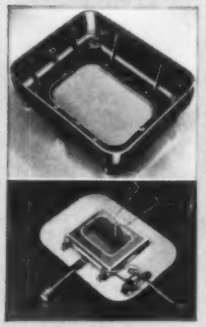
No. 28 in a Series on Plastics Skill at Work...

PRODUCT: Popcorn warmer base

CUSTOMER: Buddy Boy Popcorn Co., Elgin, Illinois

MOLDER: Richardson Co., Melrose Park, Ill.

MATERIAL: Durez heat-resistant black phenolic



PROPERLY DESIGNED RIBS, based on the molder's knowledge of plastics performance under varied service conditions, assured the customer of stability required in this molding. Heat produced by the element mounted in the molded warmer base causes no warpage or other dimensional change in this heat-resistant Durez piece, despite large size of unsupported areas.

● "Hot" is the word on the popcorn warmer that pulls in the dimes. But heat presents problems involving design and the selection of materials . . . problems you can count on a custom molder to help you overcome.

In this case the molder's experiments showed a heat-resistant Durez phenolic plastic to be the ideal material for the warmer base. Ease of production, impact strength, and self-insulation were assured. No protective coating is necessary, since the lustrous finish is integral in the molded Durez. Yet for this large unsupported molding...15" x 12" x 5"...to give satisfactory service, it must remain dimensionally stable despite daily heating and cooling.

Accordingly the molder suggested reinforcement with a simple system of ribbing. This was easy to provide for in the mold design, and had two advantages. The ribs furnish the rigidity that safeguards customer satisfaction, and in production they hold shrinkage within the narrow limits that always reveal good engineering in plastics.

Your custom molder is qualified in engineering ability, experience with plastics, and production facilities to help you use these "wonder" materials most profitably.

He is especially familiar with the unusual properties of the versatile Durez phenolics.

A capable staff of Durez field technicians offers him . . . and you . . . the specialized experience of our 30 years in developing these materials.

Our monthly "Durez Plastics News" will keep you informed on industry's uses of Durez. Ask us to send a copy regularly. Durez Plastics & Chemicals, Inc., 1208 Walck Road, North Tonawanda, N. Y.

DUREZ

PHENOLIC RESINS

- MOLDING COMPOUNDS
- INDUSTRIAL RESINS
- PROTECTIVE COATING RESINS

PHENOLIC PLASTICS THAT FIT THE JOB

Catalin Styrene ATTENDS THE DAZEY "COCKTAIL HOUR"*

Versatile CATALIN STYRENE is a very personable plastic . . . popular among manufacturers and molders . . . welcome and wanted in the home. For reasons of its utility, as well as decorative qualities, CATALIN STYRENE is continuously the recipient of invitations to attend industry's best product offerings . . . and accepts as many as present supply permits.

As component to the "Cocktail Hour," CATALIN STYRENE takes part in "breaking-the-ice". . . acts as the perfect butler . . . ably assists in preparing iced refreshments. The picture tells the story . . . Ice-cubes are placed in the metal hopper. A fully protected hand-turn cranking action grinds them to desired size (an adjustment provides for fine, medium or coarse results).

Then, and this is where plastic takes over, the ice falls into a gracefully designed, colorful, transparent, removable measure—molded of light, bright, strong, serviceable and economical CATALIN STYRENE!

In that "Cocktail Hour" has proven to be an outstanding success, we, of Catalin, share the maker's pride and satisfaction—and offer our toast to this good job—well done!

CATALIN CORPORATION OF AMERICA
ONE PARK AVENUE • NEW YORK 16, N. Y.

**Custom molded for Dazey Corporation, St. Louis, Mo., by Michigan Molded Plastics, Inc., Dexter, Mich.*

In addition to Catalin Styrene molding compounds and Cast Resins for Photoelastic Stress Analysis and ultra-high frequency insulation, the Catalin Plastics and Resins Family includes . . . **Laminating Varnishes** for decorative, mechanical and electrical applications . . . **Casting Resins** for tools, dies, jigs and fixtures . . . **Bonding Resins** for sand cores, rock wool, glass fibres, abrasives and cork . . . **Resin Glues** for furniture, wood, plywood . . . **Textile Finishing Resins** for crease resistance and shrinkage stabilization.

MODERN PLASTICS*

VOLUME 28 AUGUST 1951 NUMBER 12

CONTENTS

MODERN PLASTICS BULLETIN

A Special News Service ..... Facing p. 72

GENERAL SECTION

Color T.V.—An Opportunity and a Warning (Editorial) 5

Laminates Unlimited 73
New applications of high pressure laminates in the electrical, refrigeration, and textile machinery fields

Black Light Display 80
Molded styrene sign glows like neon when illuminated by ultra-violet light

The Glue is on the Back 81
Polyester decorative laminate with adhesive already on it can be installed by amateurs

Organic Cold Molding Compound 84
New material with phenolic binder is used in a wide variety of electrical applications

Filters for Color Television 85
by John W. Christensen
Critical optical requirements are met by acetate filters riveted to acrylic disk

Heat Sealed Lamp Shades 87
How two manufacturers are using vinyl-impregnated glass fiber materials

See-Through Chassis 90
Over 1200 acrylic parts make up an unusual display used by Plymouth

Model Acrylic Engine 91
Demonstration model of a four-cylinder engine measures only 8 by 6 by 4½ inches

Reinforced Plastic Ketch 92
Sailboat has the largest glass fiber and polyester hull ever molded

Plastics Products 94
The latest applications of plastics in consumer items

Tiny Tube Socket 158

Battle Suit 160

Graphic Laminate Door Liner 162

Phenolic in Aircraft Magnetos 165

Copolymer Display Rack 168

Bottle Insert 171

Safety Goggle 172

Vinyl Door Gaskets 174

PLASTICS ENGINEERING

Printed Circuits on Foil-Clad Plastics 99
by Robert L. Swiggett
How printed circuits are produced, fabricated, and assembled

TECHNICAL SECTION

Mechanical and Permanence Properties of Laminates 113
by Dr. Gordon M. Kline
Comprehensive information on mechanical and permanence properties required of laminates in aircraft applications

DEPARTMENTS

Plastics Digest 126

U. S. Plastics Patents 134

Books and Booklets 140

New Machinery and Equipment 148

Production of Plastics Materials 156

THE PLASTISCOPE 190
News of the Industry; Predictions and Interpretations; Company News; Personal; Meetings

Modern Plastics, published monthly by Modern Plastics, Inc., at Emmett St., Bristol, Conn. Executive and Editorial Office: 575 Madison Ave., New York 22, N. Y. Published each month by Modern Plastics, Inc. Entered as second class matter at the Post Office at Bristol, Conn., December 14, 1950, under the act of March 3, 1879.

Copyright 1951 by Modern Plastics, Inc. All rights reserved.

Subscription $5.00 a year, $8.00 for two years in the U. S., its possessions, and South America. Canadian subscription $5.00 a year, $8.00 for two years. All other countries $5.00 a year, $8.00 for two years, payable in U. S. currency. Price of this issue 75 cents per copy. Printed in the U.S.A. by the Hildreth Press, Inc., Bristol, Connecticut.

* Reg. U.S. Pat. Office.

Another new development using

B. F. Goodrich Chemical Company *raw materials*

B. F. Goodrich Chemical Company does not make these fish lures. We supply the raw materials only.

bait for a selling idea!

These real-as-life lures are tough on tuna, albacore, barracuda and other game fish, but they make fishermen very, very happy.

One of these lures used in commercial fishing brought in 5 tons of fish. You might suppose that snapping fish would have destroyed it, but it came through to be used again and again. There's a simple answer to this. These lures are made of Geon paste resin and have the wide range of characteristics of Geon polyvinyl materials.

The lures are tough, yet flexible, can take any color, are waterproof, greaseproof, acid-proof—almost indestructible. These are some of the characteristics of Geon polyvinyl materials and there are others that will interest you if you have a selling idea.

For Geon has advantages that meet so many civilian and defense product requirements. It resists heat and cold, aging and wear, many chemicals—and other damaging factors. Geon materials come in many forms, including resin, latex and compounded plastics. Demand now exceeds supply, but limited quantities are available for development work. For technical bulletins, please write Dept. GA-8, B. F. Goodrich Chemical Company, Rose Building, Cleveland 15, Ohio. In Canada: Kitchener, Ontario. Cable address: Goodchemco.

GEON RESINS • GOOD-RITE PLASTICIZERS . . . the ideal team to make products easier, better and more saleable.

GEON polyvinyl materials • HYCAR American rubber • GOOD-RITE chemicals and plasticizers • HARMON organic colors

RUBBER PHENOLICS

plus the know-how of CHICAGO MOLDED

— a logical combination for shock resistant parts

Is resistance to physical shock important in your plastics part? If so, better investigate the new rubber phenolics. True, some materials are stronger in other respects . . . but when it comes to shock resistance, the rubber phenolics are in a class by themselves. Actually, their shock resistance is 5 to 10 times as great as that of other impact-type materials!

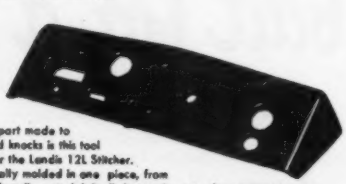
Besides, their appearance is good, their electrical properties are excellent, and their machinability is outstanding . . . drilling and tapping small holes, for instance, is fast and easy. Sounds good, doesn't it? And they ARE good . . . for scores of exacting applications like the ones on this page.

This is the vital step toward insuring a sound application of rubber phenolics: choose a molder who knows WHEN and HOW to use them . . . a firm like Chicago Molded, for instance, whose experience with phenolics extends over more than thirty years. Here you will find a combination of know-how and facilities hard to equal anywhere . . . a combination that insures successful results right from the start.

Thermoplastics, too. We mold all other commercial plastics as well . . . in one of the largest, most modern custom molding plants in the world. So, whatever your job may be, you are certain of unbiased recommendations . . . a wholly unprejudiced viewpoint. Our one concern is to help you get the most out of your molded plastics job. That, perhaps, is one of the reasons why 60% of our business comes from firms we have served for 15 years or more.

The twelve integrally molded pegs on this 12½" x 7¾" panel hold the cutters and setters for the Landis Paneled Finisher, used in shoe repair shops. Handsomely molded to withstand hard service, by Chicago Molded Products Corp.

The handle of the Unity Plug-In Searchlight gets plenty of hard service under all kinds of conditions, but this handsome, two-piece handle of rubber phenolics can certainly take it. It's easy to drill and tap for assembly, too. Another Chicago Molded job.



Another part made to take hard knocks is this tool holder for the Landis 12L Stitcher. Economically molded in one piece, from rubber phenolic material, it eliminates the cost of an assembly operation formerly necessary.

If you are planning the use of rubber phenolics . . . or any other molded plastics . . . why not talk it over with a Chicago Molded engineer? There's no obligation.

Meanwhile, let us send you our booklet, "The Story of Plastic Molding." It's packed with interesting, useful information of value to every user of molded plastics. Write today . . . on your company letterhead, please.

CHICAGO MOLDED PRODUCTS CORPORATION
1046 NORTH KOLMAR AVENUE • CHICAGO 51, ILLINOIS

CHICAGO MOLDED PRODUCTS CORPORATION

COMPRESSION, INJECTION AND TRANSFER MOLDING OF ALL PLASTIC MATERIALS

Color T.V.—An Opportunity and a Warning

Comment by more than one promotion and marketing authority who saw Columbia Broadcasting System's first color television broadcast centered around two points: first, the new challenge to package designers offered by this new medium; second, the new opportunities in color television for promotion of certain materials, including plastics.

Television is more or less a reversion to personal selling. First came the peddler who called at the house with his samples. Then came the wagon show, which enabled the salesman to reach more prospects at one time. Then came the store with goods and prices frequently hidden, and personal salesmanship the clinching factor. Then came packaging and open display. Then came visible packaging, informative labeling, and self-service. Now the cycle is almost complete with the personal salesmanship of the wagon show plus the full science of modern packaging combining to make television—and particularly color television—the greatest personal selling medium ever imagined.

Since more than 85% of all human mental impressions are gained through the eye, the importance of the package as it will appear on color television cannot be overestimated. The opportunities for plastics packaging are incalculable. Through color television the customer will see the product in hands that might be her own, in use in a kitchen that might be her own, and will be able to identify that package immediately in the store. If the package has re-use value (as a refrigerator container, or a button box, or a tumbler, for example) that too can be shown with complete sales clarity. The factors of weight, size, shape, and general handiness will have new importance in presentation. Through this new medium the use of plastics in packaging should be increased.

The other point of interest—the opportunity for sales presentation of plastics products by color television—is quite as important. No other materials known to man offer such fabulous combinations of beauty, durability, and cleanability. No products made in any category offer the demonstration possibilities that plastics products do. It is almost inevitable that the dramatization of the color and texture properties of plastics on television will mean more sales opportunities for this industry.

There is one thing, though, to remember: The natural inclination of all human beings in handling plastics products is to abuse them! And plastics products will be abused in their promotion via color television. This is one medium through which it will not be possible to sell junk, because the sales clincher will be the fact that the demonstrator will give the product more abuse in the demonstration than the consumer is ever likely to give it.

Sleazy film, thin sections of molded parts, poor assembly, bad finishing, misapplication of materials will show up over color television.

The opportunity is there. It is immense. But it is only an opportunity for the finest plastics products.

President and Publisher
CHARLES A. BRESKIN

Editorial Staff

Editor: HIRAM MCCANN
Technical Editor: DR. GORDON M. KLINE
Engineering Editor: FRED B. STANLEY
Senior Editor: R. L. VAN BOSKIRK
Managing Editor: A. PAUL PECK
Art Director: DONALD R. RUTHER
Associate Editor: WARREN H. GOODMAN
Assistant Managing Editor: E. S. BLACK
Assitant Editor: JOAN MOISSEIFF
Midwestern Editor: VAL WRIGHT
Readers Service: EMMA TURAK

Business Staff
Vice President and General Manager:
ALAN S. COLE

P. H. Backstrom — B. W. Gussow
M. A. Olsen — W. F. Kennedy
J. M. Connors — J. C. Galloway
R. C. Beggs — S. S. Siegel

Promotion Manager: PHILIP W. MULLER
Production Manager: DANIEL M. BROADS
Asst. Production Manager: B. J. FARINA
Production: ELAINE F. KATZ
Asst. to Publisher: THEODORE B. BRESKIN

Circulation Department
Circulation Manager: FREDERICK A. KLEIN

Executive and Editorial Offices
575 Madison Ave., New York 22, N. Y.
Tel., PLaza 9-2710

Branch Offices
Chicago 11: 101 E. Ontario St.
J. M. Connors Tel., Delaware 7-0060

Cleveland 14: 815 Superior Ave.
R. C. Beggs Tel., SUperior 1-0737

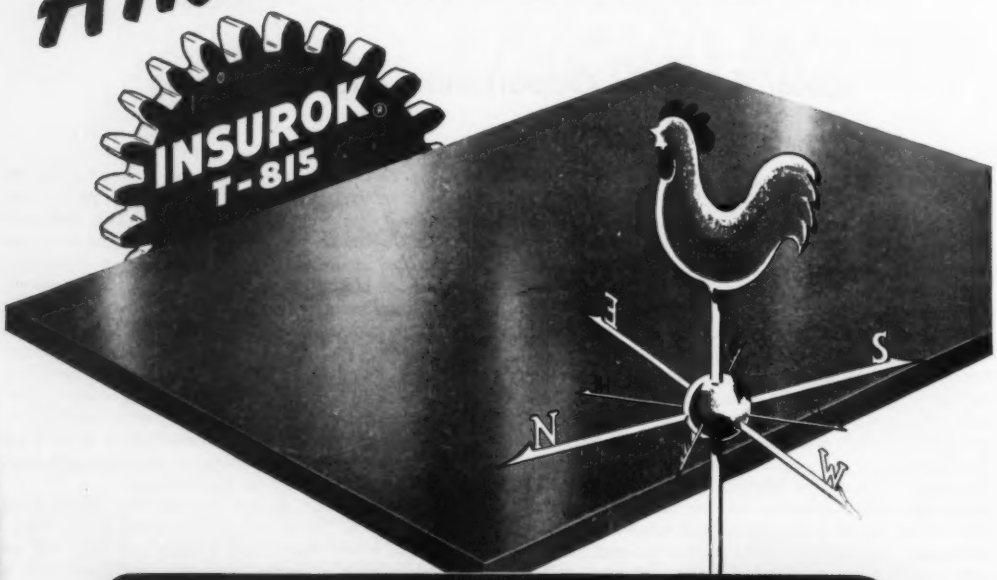
Los Angeles 17: 816 West Fifth St.
J. C. Galloway Tel., Mutual 8335

England: 10/12 Broad St. Ave., Blomfield St., London, E. C. 2
L. H. Dolaro Tel., London Wall 4231

MODERN PLASTICS is fully protected by copyright and nothing that appears in it may be reprinted wholly or in part without special permission.

Member Audit Bureau of Circulations
MODERN PLASTICS is regularly indexed in Industrial Arts Index and Industex.

A New REINFORCED LAMINATE For Gears and Mechanical Parts



Provides UNIFORM STRENGTH IN *ALL** DIRECTIONS

Plus . . . Smooth Mechanical Finish . . . Good Electrical Properties

Its reinforcement is different!... that's why this new material provides such a unique combination of properties.

Instead of woven fabric, new INSUROK T-815 is reinforced with unwoven cotton fibres, random-laid in the form of a mat. Thus, it exhibits high uniform strength—in the main direction, cross direction, and *all intermediate angles!* This property is valuable in gears and other mechanical components, where teeth or other sections must have equal strength.

But Grade T-815 has more than uniform strength. Its electrical properties are good, and it machines well to smooth, clean surfaces, with finish and texture superior to any cotton fabric-base laminate made. Furthermore, T-815 can be punched—hot or cold, depending upon the thickness—making it valuable for thin electrical parts requiring high strength.

Investigate new INSUROK T-815 for your product, today.

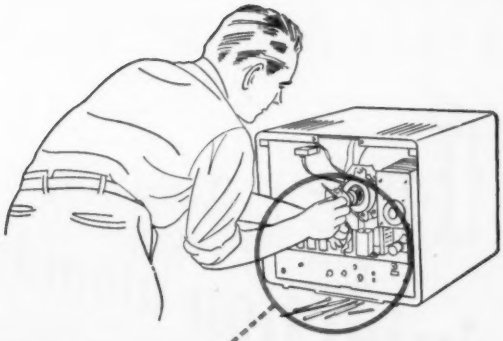
*All directions in the plane of the sheet

The RICHARDSON COMPANY

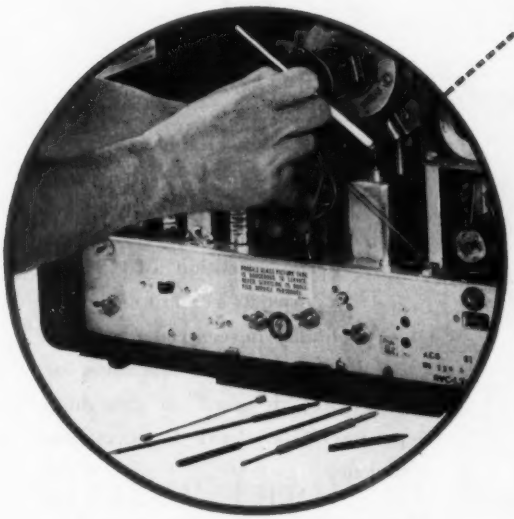
FOUNDED 1858—LOCKLAND, OHIO

2789 Lake St., Melrose Park, Illinois (Chicago District)

SALES OFFICES: CLEVELAND • DETROIT
INDIANAPOLIS • LOCKLAND, OHIO • MILWAUKEE
NEW BRUNSWICK, (N. J.) • NEW YORK
PHILADELPHIA • ROCHESTER • ST. LOUIS



Flexible TV tools of Du Pont nylon plastic



TV aligning tools molded by Teal Molding Co., New Haven, Conn., for JFD Manufacturing Co., Inc., Brooklyn, N. Y.

are easy to handle . . . tough . . . insulated against high voltage

Aligning the tuning circuit in television sets is a delicate job. It's precision work in hard-to-reach places within the set, working close to high-voltage equipment. These aligning tools made with nylon plastic make the job easier and safer.

Because of the flexibility of Du Pont nylon, the tools can be bent to reach awkward locations. It's tough enough to withstand the abuse that such tools get. And the insulating characteristics of nylon protect service men from shock if the tools contact parts of the set that carry high voltage.

There are many uses in electronics and related fields for the unique combination of dielectric properties and toughness, resiliency and heat-resistance offered by Du Pont nylon. Its properties may well help you improve your product.

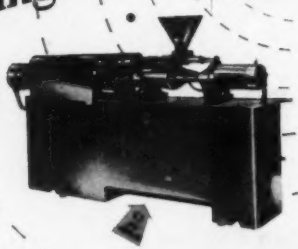
Demand for nylon plastic currently exceeds supply. However, we suggest you investigate its properties for future applications. We will gladly discuss the availability of experimental quantities for development work. For additional information on nylon and other Du Pont plastics, write:

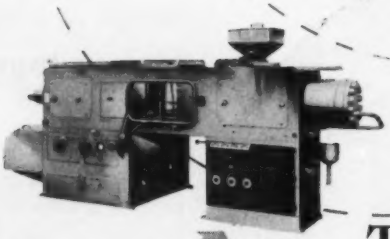
E. I. du Pont de Nemours & Company (Inc.)
Polychemicals Department, District Offices:
350 Fifth Avenue, New York 1, New York
7 S. Dearborn St., Chicago 3, Illinois
845 E. 60th St., Los Angeles 1, California

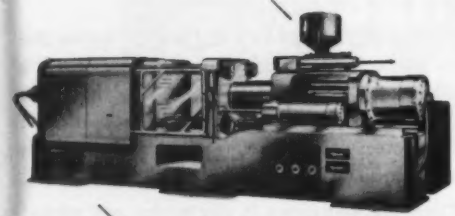
DU PONT
REG. U. S. PAT. OFF.
BETTER THINGS FOR BETTER LIVING
...THROUGH CHEMISTRY
Polychemicals
DEPARTMENT
PLASTICS • CHEMICALS

focus on injection moulding machines

PECO PROJECTILE PRODUCTS







THE attention of Plastics manufacturers may profitably be centred on PECO Injection Moulding Machines, for they are designed to give high productivity through maximum efficiency.

They are built in 2oz., 4oz., 6oz., 8oz., and 16oz. capacities. They represent the most up-to-date development of this type of plant.

Full particulars will be sent on request.

MOULDS

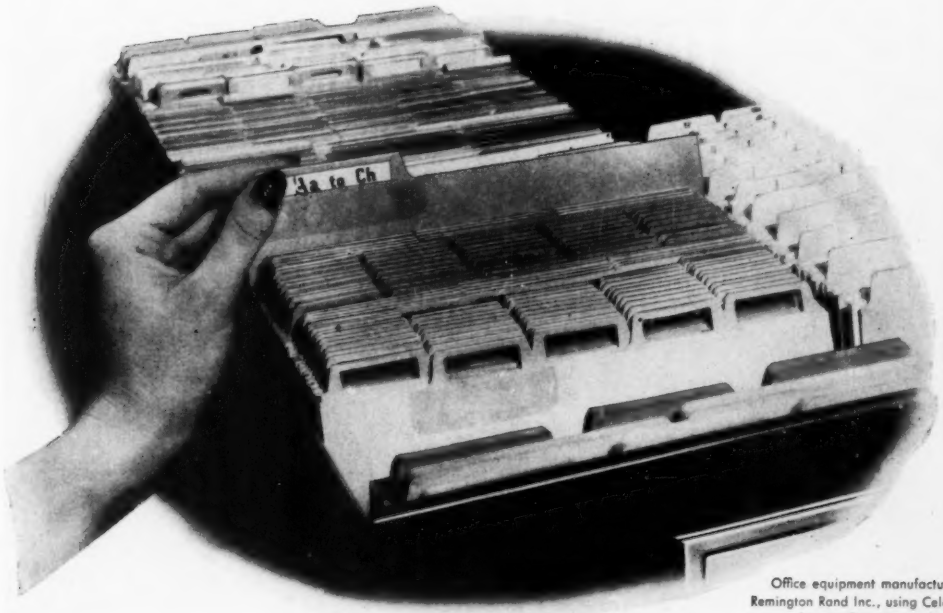
PECO MOULDS. Expert designers and mould makers are employed and moulds can be supplied to samples submitted, including die-sinking models if desired. An important side of the Company's work is the hobbing of cavities for moulds and medallions—the plant includes a 3,000-ton Hobbing plant. Master Hubs to customers' samples made as required.

THE PROJECTILE & ENGINEERING COMPANY LTD.

ACRE STREET, BATTERSEA, LONDON, S.W.8, ENGLAND

Telephone: Macaulay 1212 Telegrams: "Profectus, Claproad, London". Cables: "Profectus, London".

Are You Up-to-date on Acetate?

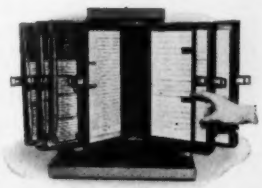


Office equipment manufactured by Remington Rand Inc., using Celanese* Acetate Transparent Sheeting.

Acetate...for a Better Look at Business

Office staffs and factory personnel get their business information through *acetate:* visible forms and records, index tabs, guide cards, transparent overlays for blueprints and worksheets. Celanese *acetate* sheeting has proved itself the perfect material for this purpose.

Celanese acetate is always optically clear—it doesn't discolor or crack even after years of constant use. Fingerprints, grease, dirt wipe right off the satin-smooth surface. No matter how often files and record books are handled, acetate won't tear or fray . . . never gets dog-eared. Fact-finding is fast and simple with indicator tabs and strips of transparent tinted acetate.

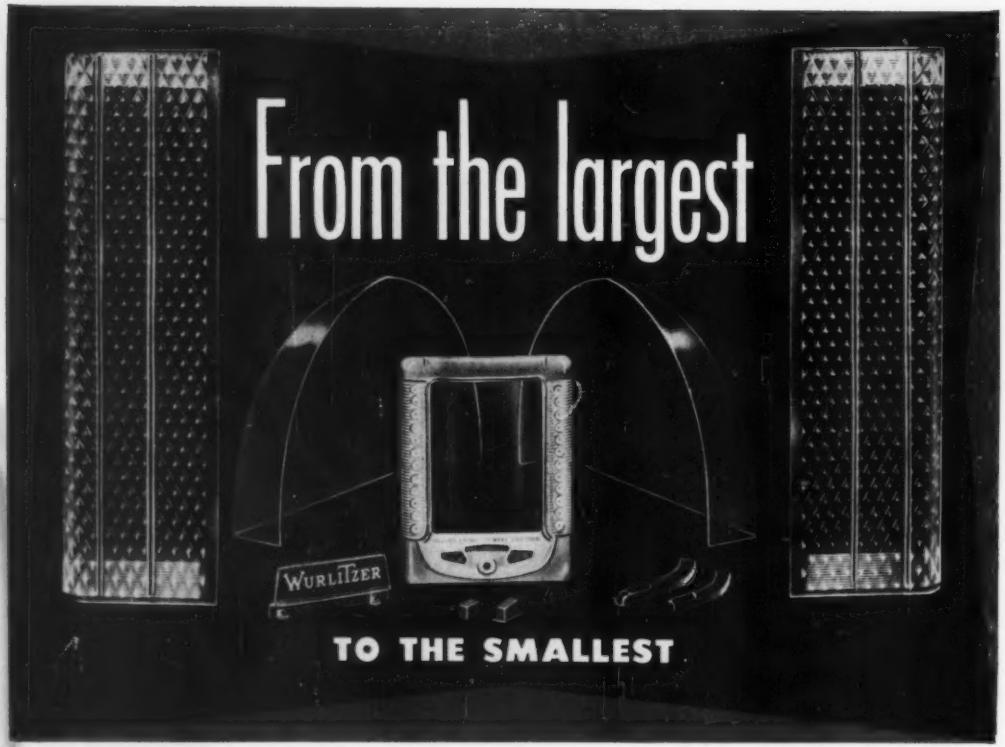


Celanese Corporation of America, Plastics Division, Dept. 101-H 180 Madison Avenue, New York 16, N. Y. In Canada, Canadian Cellulose Products, Ltd., Montreal and Toronto.

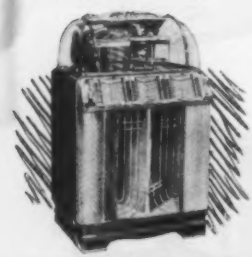
*Reg. U. S. Pat. Off.

Celanese*® **Acetate

SHEETING



An efficient, economical single source for Custom Injection Molded Plastics . . . ERIE RESISTOR



Ten different parts, ranging from small selector buttons to the 27-inch curved pilasters are economically custom molded by ERIE for this Wurlitzer Model 1400 phonograph.

A great battery of 23 presses, in capacities from 2 to 60 ounces, make ERIE RESISTOR one of the largest in the custom injection molding industry, with a versatility that provides economical production of pieces from minutely small items to the largest produced.

Two-ounce presses give economical production on the smallest pieces, while 60-ounce presses have a capacity for the largest pieces made. At ERIE RESISTOR the wide range of capacities between presses make it possible to plan, with single or multiple cavity dies, for efficient production of any order, large or small, for pieces large or small. All dies are designed in our own plant, by engineers whose experience extends through the life of the industry.

Regardless of your plastic needs—a functional product part, a sales-slanted durable package, or a lasting identification symbol—you will find the answer at the Plastics Division of Erie Resistor, the pioneer custom injection molder.

Plastics Division

ERIE RESISTOR CORP., ERIE, PA.

LONDON, ENGLAND . . . TORONTO CANADA

Molding Natural Nylon at Chicago Molded Products

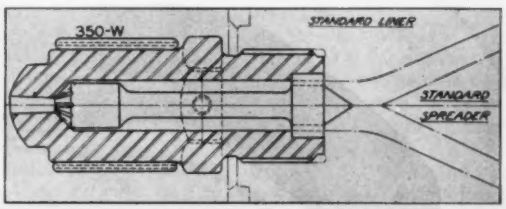
Molding Black Nylon parts on 8 oz. "Reed"

Nylon parts furnished by Chicago Molded Products, Hauser Products, Inc., and American Molded Products are molded on 8 oz. "Reeds".

PUTTING THE HEAT ON NYLON!

With the increasing demand for nylon parts, many progressive molders, like Chicago Molded Products Corp., are "putting the heat on nylon" using standard Reed-Prentice injection molding machines equipped with a special nozzle and heating arrangement.

The newly-designed nozzle prevents drooling of the low-viscosity plasticized nylon, assuring far better results. "Nylon" nozzles are available for all Reed-Prentice injection presses and conversion to nylon molding can be done quickly. Write for our new "Nylon" Nozzle bulletin containing further details.



Unique design of Reed-Prentice "Nylon" Nozzle as used with standard heating elements.

THE WORLD'S LARGEST MANUFACTURERS OF INJECTION MOLDING MACHINES

REPRESENTATIVES:

Detroit ..... Kordenbrock Machinery Co.
Grand Rapids ..... Joseph Monahan Co.
Syracuse ..... J. F. Owens Machinery Co.
Houston ..... Preston Machine Tool Sales Co.
Seattle & Spokane ..... Star Machinery Co.
Minneapolis ..... Chas. W. Stone Co.

INJECTION MACHINES

REED-PRENTICE CORP.

WORCESTER MASS., U.S.A.

MAIN OFFICE: **677 Cambridge St. WORCESTER 4, MASS.**

BRANCH OFFICES:
NEW YORK: 75 WEST STREET
CLEVELAND: 1213 W. 3rd ST.
CHICAGO: 2400 W. MADISON ST.
LOS ANGELES: 2314 SANTA FE AVE.

looking for someone who can put PLASKON ALKYD parts in your hand?

We can—whether you need a few parts or more than a few million. Design? Tooling? We'll take care of it, along with any other problems that come up in producing Alkyd or other thermosetting plastic parts. If you need parts with the excellent characteristics of Plaskon Alkyd, one of our engineers will be glad to talk facts and figures with you. Just write, wire, or phone. Or let us know when you'd like to have our plane and pilot whisk you to our plant to discuss your parts problems.

No obligation, naturally.

plastic research products, urbana, ohio

PRP

when you look for plastic moldings, look first to...

CUSTOMERS COME BACK TO MPM

The most popular MPM extruder, the 3½″. Illustrated here with 36″ flat sheeting die.

A LARGE MATERIAL supplier has installed seven machines over a period of four years. All were ordered singly.

A large electric concern has installed four wire covering installations over a period of two years. All were ordered singly.

In this case, it has not been necessary for us to visit the customer's plant. It is very common to receive reorders through the mail or by phone. In numerous instances, delivery of a single MPM unit has been followed by orders for several more of the same. One of the largest, best-known film producers bought nine machines a short while after the first was put into operation.

In every corner of the world, on every continent, MPM extruding machines are delivering the confidence-inspiring, profit-producing performance that makes customers satisfied. Material suppliers depend exclusively on these machines for experimental extrusion work in their development laboratories.

MPM extruders come in sizes from 1½″ to 6″, and are designed to extrude the widest range of thermoplastics. Their long service is guaranteed by the use of the finest materials and construction throughout.

If you would like facts and figures about an MPM extruder to do your job, just drop us a letter. We would like to add your name to our ever-growing list of satisfied customers.

15 Union St., Lodi, N. J., U. S. A.
Cable Address: MODPLASEX

FIGHT WASTE

with

DISSTON MOLD and HOB STEELS

Boost productive efficiency ... Cut production costs!

Increasing the production of plastics is of paramount importance today! This is a direct challenge to productive efficiency as well as to production capacity. It means making more with less by doing it more efficiently!

And, in the manufacture of plastic products, there is no factor of greater importance than the selection of mold and hob steels. The choice of the right steels not only helps eliminate production difficulties and assure a perfect product, it also helps keep manufacturing costs at their proper levels!

FIVE DISSTON STEELS FOR HOBS AND MOLDS

DISSTON PLASTIRON®: A low carbon iron; specially inspected to assure freedom from porosity, dirt, slag, or other impurities. Ideal for hobbing difficult shapes and for short run jobs.

DISSTON PLASTALLOY®: A low carbon-nickel-chrome mold steel, especially annealed to provide ease of hobbing. Develops an extremely hard, deep case having high resistance to swamping and erosion.

DISSTON PLASTIKUT®: A "cut mold" steel with alloy content for maximum core and case strength. Because of its hardness, Plastikut must be machined. But its ability to stand up under long runs makes its use economical.

DISSTON HICROMAN: An extremely tough steel which will harden completely through from a low temperature. Particularly suitable for difficult hobs—designs which include small lugs, thin sections, and difficult angles.

DISSTON CROLOY: An air-hardening steel for special applications. Has been applied with particular success to forces, punches, and machined molds designed for long runs, and for use on more abrasive materials.

Determining which of these Disston Steels will best suit your needs may require careful analysis. Disston metallurgists and engineers will be glad to assist and advise you without obligation. Write, outlining your problem; all correspondence handled in strict confidence.

Disston's "Fight Waste" Plan for Tool Steel Users

Help stretch the supply of available Tool Steels! Disston will send you—FREE—individual fact cards covering six basic types of Tool Steels. Each card contains information on the selection, working, and application of the subject steel to help you get better performance and longer tool life—to help you cut waste of vital steels!

ORDER THESE CARDS IN ANY QUANTITIES

No. S-1 High Speed Steel, Tungsten-Molybdenum Type
(Comparable to DISSTON 6-N-6)

No. S-2 Water-Hardening Carbon or Carbon-Vanadium Tool Steel
(Comparable to DISSTON Best Tool or Vatool Steel)

No. S-3 Air-Hardening, High-Carbon, High-Chromium Steel
(Comparable to DISSTON Croloy)

No. S-4 Oil-Hardening Tool Steel
(Comparable to DISSTON Mansil)

No. S-5 Chrome-Tungsten Chisel Steel
(Comparable to DISSTON Keystone)

No. S-6 Nickel-Chrome, Oil-Hardening Tool Steel
(Comparable to DISSTON Nicroman, No. 827)

"SCRAP TURNED IN...IS STEEL TURNED OUT!"

Steel mills urgently need more scrap now! Help yourself get more steel by keeping your scrap moving into channels serving steel mills.

HENRY DISSTON & SONS, INC. 834 Tacony, Philadelphia 35, Pa., U.S.A.

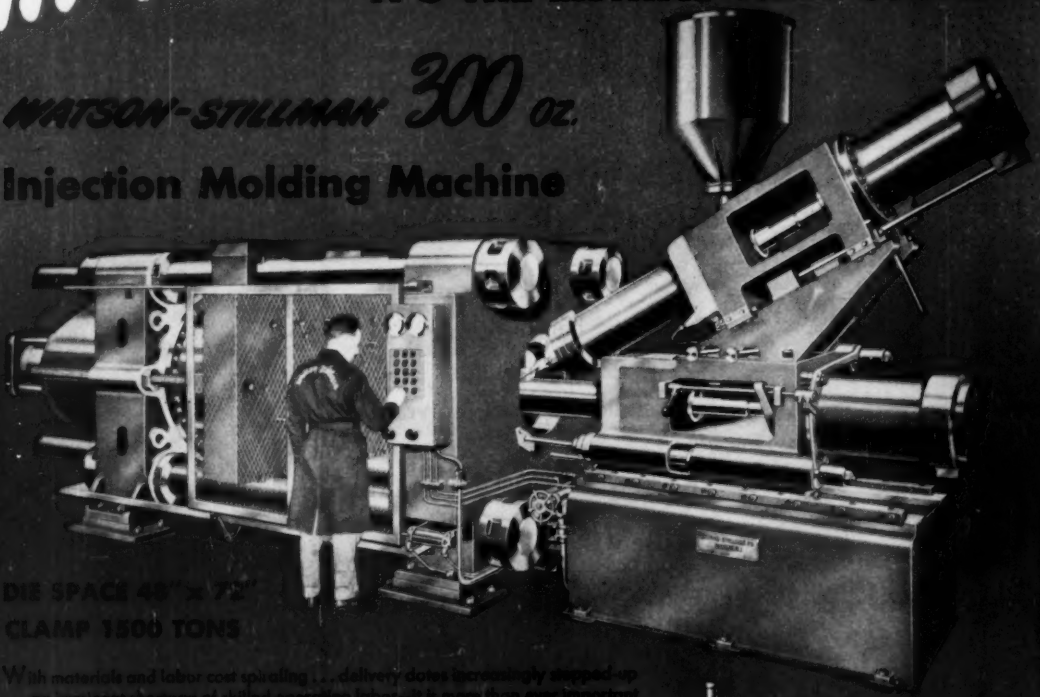
New England:
ACHORN STEEL COMPANY
381 Congress Street, Boston 10, Mass.

Distributors: Metropolitan New York and Northern New Jersey
BRIGHT STEEL CORPORATION
Offices and Warehouses: 528-540 W. 22nd St., New York 11, N.Y.; and 224-236 Culver Ave., Jersey City 5, N. J.

In times like these...

IT'S THE EXTRAS THAT COUNT!

WATSON-STILLMAN 300 OZ. Injection Molding Machine



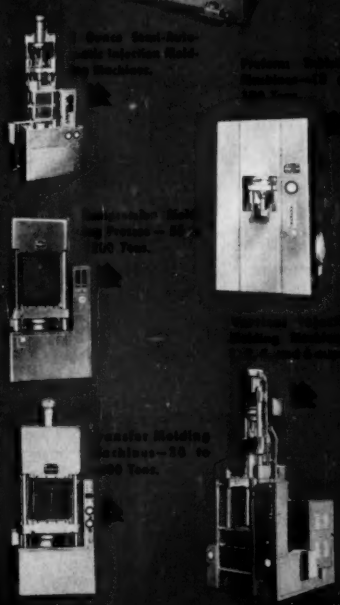
DIE SPACE 48" × 72"

CLAMP 1500 TONS

With materials and labor cost spiraling . . . delivery dates increasingly stepped-up . . . an imminent shortage of skilled operating labor—it is more than ever important for PLASTIC MOLDERS to know all their suppliers . . . and everything each has to offer.

As THE pioneer [illegible]-two-year consistent leader in the design and construction of Plastics Molding Machinery, W-S is in an especially good position to offer molders of every type a complete service. Not only the finest and most extensive line of molding machinery anywhere available . . . but extra dividends in the form of engineering counsel on materials, die-design, and plant layout.

In times like these, such extra service, extra attention to every detail phase of your operation is increasingly valuable. Because of its machine capacity range of 1-300 ounces, and the broadest range of injection, compression and transfer molding machines, W-S is your logical consultant on any projected expansion. And once you have enjoyed the advantages of COMPLETELINE service—extending far beyond equipment needs alone—you will always consult W-S first on new molding equipment and how to use it.



WATSON-STILLMAN

HYDRAULIC MACHINERY DIVISION-Estab. 1846

Main Office, 180 Alaska Rd., Roselle, New Jersey

Branch Office 228 No. La Salle St., Chicago, Illinois

Manufactured in Canada by—Canadian Vickers, Ltd., Montreal

REPRESENTATIVES

Birmingham 3, Ala. ..... Sloane M. Hardwicke
Dallas, Texas ..... W. S. F. Sales Company
Denver 2, Colo. ..... Davenport Machine Tool Co.
Indianapolis, Ind. ..... W. E. Rittenhouse Sales Co.
Los Angeles 11, Calif. ..... J. A. Jones, Inc.
Pittsburgh 19, Pa. ..... Hunter Bros. & Co.
Rochester 12, N. Y. ..... Andrew-Williams Co.
San Francisco 24, Calif. ..... Pacific Coast Machy. Sales Co.
St. Paul 4, Minn. ..... Rochester Machine Tool Co.
Seattle, Wash. ..... Rochester Machine Tool Co.

Foreign Sales Representatives Offices [illegible]

W-S "COMPLETELINE"—SHORTEST DISTANCE FROM PRODUCTION TO PROFIT

NIXON PLASTICS

Sheets • Rods • Tubes

cellulose acetate
cellulose nitrate
ethyl cellulose
cellulose acetate butyrate

Rigid Vinyl Sheeting

Molding Powder

cellulose acetate
ethyl cellulose

NIXON NITRATION WORKS

Founded 1898

NIXON • NEW JERSEY

Home Office: NIXON, NEW JERSEY
Phone: New Brunswick 2-1121
New York Extension WOrth 4-5290

M. BREITKOPF — W. B. SAVAGE — W. A. OLSEN
W. G. TUCKER — M. W. PETERS — C. E. O'NEAL

Chicago, Ill.
F. W. LINDAHL
MRS. M. FAHRINGER
510 North Dearborn Avenue
Phone: Michigan 2-2363

St. Louis, Mo.
C. B. JUDD
403 Louderman Bldg.
317 North 11th St.
Phone: Chestnut 8493

New England
Cranston, R.I.
G. L. LOTZ
57 Garden City Dr., Apt. 9
Phone: Stuart 1-4385

Leominster, Mass.
A. F. PERRY CO.
A. F. PERRY
C. A. DOVIDIO
Box 214

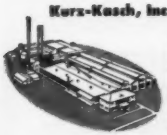
Canadian Distributor: Crystal Glass & Plastics, Ltd., 54 Duke Street, Toronto, Ontario, Canada

ELECTRICAL INSULATION

A High-Powered Plastics Story!

VERSATILITY—that's the theme of the Kurz-Kasch plastics story in the electronic field. Parts like those above—*millions* of them—are examples of Kurz-Kasch mass-production moulding of all types of thermosetting compounds during war and in peacetime. They measure up to exacting dimensions—pass underwriter requirements—are produced by the millions from moulds made for long productivity. They exemplify the sound and economical moulding methods we've helped to pioneer for the use of our country's leading electrical manufacturers. That's a "nutshell" story of what Kurz-Kasch has been able to do in the electrical field alone. Our entire output, of course, goes further—to a complete cross-section of American industry. Maybe we can help *you*. You can find out by telephone.

Kurz-Kasch, Inc. • 1415 South Broadway • Dayton 1, Ohio



BRANCH SALES OFFICES: New York, *Lexington 2-6677* Rochester, *Hillside 2415M* • Chicago, *Harrison 7-5473* Detroit, *Trinity 3-7050* • Philadelphia, *Granite 2-7484* Dallas, *Lakeside 1022* • Los Angeles, *Prospect 7503* St. Louis, *Delmar 9577* • Toronto, *Riverdale 3511*

EXPORT OFFICE: 89 Broad Street, New York City, *Bowling Green 9-7751.*

Kurz-Kasch

FOR OVER 35 YEARS PLANNERS AND MOULDERS IN PLASTICS

Photo courtesy of Walla Walla College, Walla Walla, Washington

another OLSEN SUPER "L" training tomorrow's engineers

Put an Olsen in your plant and gain all of the advantages of low-cost testing with high accuracy.

Engineering schools and colleges as well as industries all over the country are enthusiastic about the Olsen Super "L" with **SelecTrange** indicating system which reduces accurate testing to its utter simplicity—a 50 to 1 ratio of testing ranges—change from one range to another during test—automatic lighting of range in use; 3 ranges on one 28" dial.

The 60,000# machine shown has 14 inch span between screws; it is also available with 30 inch span.

The Olsen Super "L" is the best buy in universal testing machines available today. It is low in cost, ruggedly constructed with traditional Olsen workmanship, and meets ASTM, governmental and service specifications.

WRITE TODAY FOR BULLETIN 40.

TINIUS OLSEN

Testing & Balancing Machines

TINIUS OLSEN
TESTING MACHINE CO.
2050 Easton Rd., Willow Grove, Pa.

the CASEIN PLASTIC

in beautiful, fast colours
and a variety of effects

ERINOID LIMITED

GLOUCESTERSHIRE · ENGLAND

TELEPHONE: STROUD 810*

Designed in Metal...
to give you samples before blueprints

Every new SPEED NUT design is worked out on manual presses to provide samples for testing and approval BEFORE blueprints of the part are drafted

SPEED NUT time-savings begin early. Experimental samples are created faster because Tinnerman engineers streamline the design process.

A design-in-metal is created with only a rough draft as a guide. Dies that pierce, bend, trim are selected from thousands like those illustrated below. These are set up in a series of manually operated presses to shape bits of metal into fasteners engineered for specific fastening functions. The samples produced are accurate prototypes of the finished fasteners, and can be used for mock-up assemblies.

These parts are then tested and approved by the customer before blueprints are drafted and the part is put into production.

In times like these, high-geared fastener engineering saves valuable production hours and profit dollars. Proof of Tinnerman's ability to serve you is outlined in a new 20-page booklet, "A Story of Quality". Write for your copy. TINNERMAN PRODUCTS, INC., Dept. 12, Box 6688, Cleveland 1, O. In Canada: Dominion Fasteners Ltd., Hamilton. In Great Britain: Simmonds Aerocessories, Ltd., Treforest, Wales.

Looks like any organosol—

but PLIOVIC AO makes a big difference

ONE fresh-ground organosol looks just like any other — but those made with PLIOVIC AO — Goodyear's use-proved vinyl copolymer for organosols— have outstanding differences.

With PLIOVIC AO, you get all these unique advantages:

- **Shorter grinding time**
- **Higher gloss**
- **Better clarity of film**
- **Greater heat stability**
- **Lower fusing temperatures**

And you get all these advantages without sacrifice of physical properties you can obtain with your present resin!

For calendering, extrusion, or molding applications, general purpose PLIOVIC is suggested and can be used to advantage over other resins. All forms of the resin are currently in short supply, but now is the time to plan for future use when full availability returns.

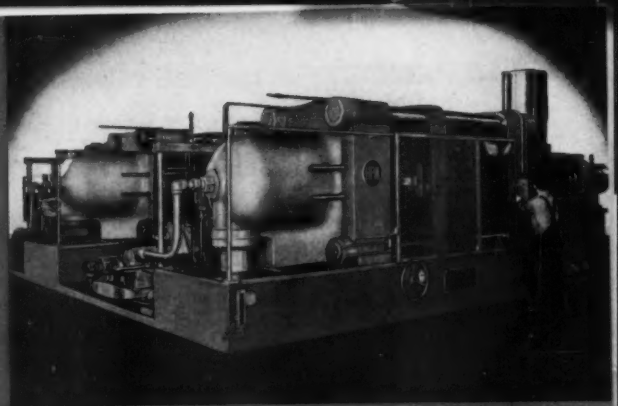
First step is to evaluate PLIOVIC in your own laboratory. So send today for full details and samples for testing to:

Goodyear, Chemical Division
Akron 16, Ohio

GOODYEAR

Pliovic—T. M. The Goodyear Tire & Rubber Company, Akron, Ohio

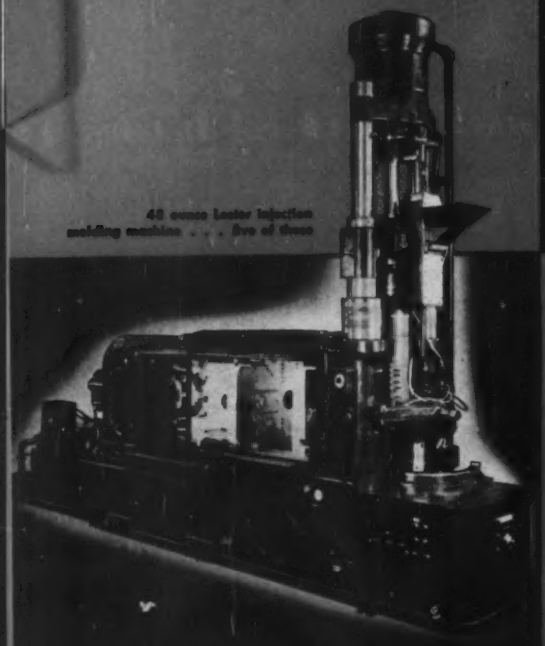
Partial view of Ideal's plastic molding room



60 ounce HPM injection molding machine . . . six of these

From now

40 ounce Lester injection molding machine . . . five of these



Over 100 tool and die makers and apprentices work in Ideal's toolrooms

IDEAL'S HAT IS IN THE RING
CUSTOM MOLDING

From now on, you'll owe it to your company, your product and your stockholders to check first with the world's mightiest plastics molding center before you place any injection molding order!

"Mightiest"—

on...

that tells why IDEAL can turn out your future molding assignments *faster* and *better* and at *lower* net cost . . . Greater injection molding capacity than anywhere else on earth and, by year's end, no less than *six* 200 and 300-ounce presses more . . . A 3,000-plus labor force . . . Two multi-million dollar tool shops . . . Two engineering laboratories . . . A full-scale plastics compounding plant.

But seeing is believing. To really *know* what kind of a production giant is now at your disposal, you should *see* the machines and *meet* the men who control them. Write now, without obligation, to Sales Department, Ideal Plastics Corporation, 184-10 Jamaica Avenue, Hollis 7, New York. Midwest Representative, Steel Mill Products Co., 176 West Adams Street, Chicago 3, Illinois.

Better Molded Plastics **Ideal** *for Industry & Home*

why carry three spares when one can do the trick?

Years ago a motorist loaded down his car with plenty of spares. He had to. Tire design was such that blowouts were commonplace—and expected.

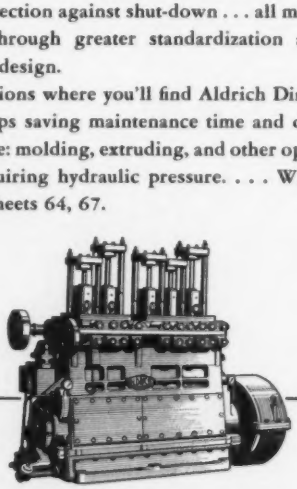
But look at the trim modern car! One spare is plenty—and it's seldom used.

Similarly, not so long ago a company had to stock three or more sets of spare parts to cover reciprocating pump needs. Today, the same company—by using Aldrich 5″ Stroke Direct Flow Pumps—inventories but *one* set of spares to cover a 100 to 275 hp range.

Construction of Aldrich Direct Flow Pumps features wearing parts—valves, plungers, packing, crossheads, wrist pins, etc.—interchangeable within *each* stroke series. This covers 3, 5, 7 and 9 plunger units for the 5″ series, ranging up to 275 hp, or for the 6″ series, from 300 to 900 hp. Rather than enlarge the stroke, Aldrich added cylinders to increase pump capacity.

To what advantage?—You benefit through interchangeability, fewer spare parts to tie up money and space, simplified maintenance, and better protection against shut-down . . . all made possible through greater standardization and improved design.

Applications where you'll find Aldrich Direct Flow Pumps saving maintenance time and dollars include: molding, extruding, and other operations requiring hydraulic pressure. . . . Write for Data Sheets 64, 67.



THE ALDRICH PUMP COMPANY

6 GORDON STREET • ALLENTOWN, PENNSYLVANIA

...Originators of the Direct Flow Pump

Representatives: Birmingham • Bolivar, N. Y. • Boston • Buffalo • Chicago • Cincinnati • Cleveland • Denver • Detroit
Duluth • Houston • Jacksonville • Los Angeles • New York • Omaha • Philadelphia • Pittsburgh • Portland, Ore.
Richmond, Va. • St. Louis • San Francisco • Seattle • Spokane, Wash. • Syracuse • Tulsa • Export Dept.: 751 Drexel Building, Phila. 6, Pa.

HERCOCEL*E ANSWERS a Call for Ethyl

. . . this time from the Signal Corps for the telephone handsets used in mobile units. It's a call for top performance in plastics whatever the time or place. This durable all-weather plastic serves well under conditions ranging from arctic cold to tropic heat and humidity, in a variety of applications involving severe exposure.

As a result of many such calls, the present supply of Hercocel E available for non-defense needs has been sharply curtailed. But there's still no limit here at Hercules on the design and technical assistance available to you in the long-range development of new uses for this versatile *quality* plastic. We invite your inquiries.

HERCULES POWDER COMPANY Cellulose Products Department • 916 Market St., Wilmington, Del.

MOLDABILITY
•
IMPACT STRENGTH
•
DIMENSIONAL STABILITY
•
LIGHTWEIGHT
•
DURABILITY
•

Signal Corps telephone handset molded with Hercocel E (ethyl cellulose molding powder) by Cowan-Boyden Corporation, Providence, Rhode Island, for Connecticut Telephone & Electric Corporation, Meriden, Conn.

HERCULES *Cellulosic Plastics*

*TRADE-MARK

CP51-6

One of the industry's finest equipped plants with over 50,000 square feet of floor space in the heart of the industrial Midwest.

The newest and most modern injection molding machines.

New 76 ton giant . . . 300 ounce capacity . . . 1500 ton clamping pressure.

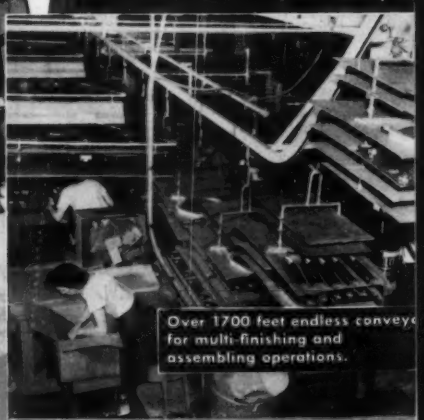
bigger, better service for you . . .

- **Knowledge which comes with experience . . .**
- **Goodwill which develops through many years of pleasing customers . . .**
- **Skilled, painstaking personnel with the customer's point of view . . .**
- **Ability to do the *complete* job—design, engineer, tool, mold and finish . . .**
- **World's finest equipment located in the heart of the Industrial Midwest . . .**

These are the ASSETS that influence alert, well-informed manufacturers—with a sense of values and a receptive attitude toward change, when change means product improvement—to SELECT AMOS for the *finest* in Custom Injection Molding.

Topflight design experts work for you at Amos.

Fully equipped mold maintenance and mold building shops.



Over 1700 feet endless conveyo for multi-finishing and assembling operations.

for many applications

YOU DON'T NEED METAL INSERTS

with ROGERS FIBERLOYS CORPORATION

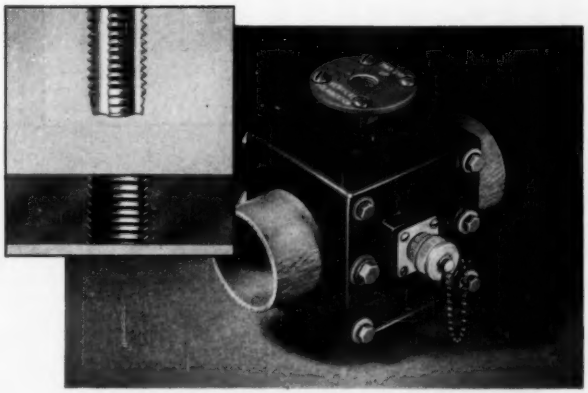
Tap Rogers Phenolic Fiberloys at High Production Speeds and Get Clean, Strong Threads.

Or Use Self-Tapping Screws and Be Sure Of a Firm, Non-Cracking Grip.

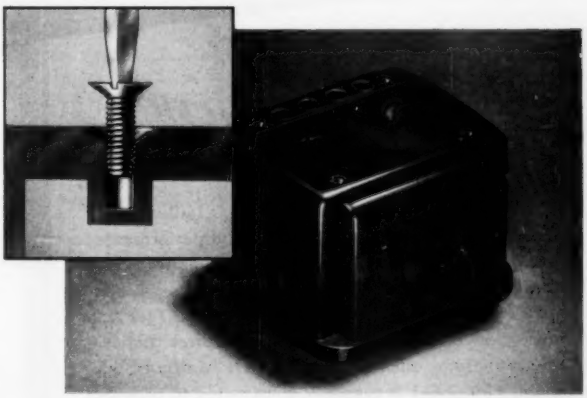
You can eliminate metal inserts in many of your molded parts by using Rogers impact phenolics. You'll save money, speed up your molding operations, and reduce some supply headaches.

Rogers materials can be used in two ways: as diecut inserts in place of metal, with general purpose phenolics, or for the complete part if high overall strength is required.

Various grades of Rogers impact phenolics are available to meet specific requirements. If you have special problems, Rogers can develop a made-to-order material. We specialize in special formulations.



Antenna mast of Rogers impact phenolic tapped at high speed for machine screws.



Self-tapping screws are firmly secured in Rogers impact phenolic transformer housing.

Better Parts for Better Products

ROGERS
CORPORATION
Established in 1832

ADDED FACTS ABOUT ROGERS IMPACT PHENOLICS CORPORATION

FAST CURING	Impact strength is combined with flexural strength.
EASY TO MOLD	Bulk compounds can be automatically preformed.
LOW BULK FACTOR	Sheet compounds can be diecut into preform blanks for molding.

EASY-READING BOOKLET — **Please write for "Here's Rogers and Its Fiberloys." Dept. P, Rogers Corporation, Manchester, Conn.**

injection molding machines by DE MATTIA

—the standard of MOLDING EFFICIENCY

The De Mattia Model C-1, illustrated, incorporates the ultimate in design and performance in injection molding machines. Exceptionally heavy tension members, high mold clamping pressure and uniform hydraulic pressure on the entire die face are just a few of the many De Mattia features that increase molding efficiency. Like all De Mattia equipment, Model C-1 is ruggedly constructed to provide long service in continuous use — the kind of service that has made the name De Mattia a standard for reliability throughout the industry.

DE MATTIA HORIZONTAL MODEL C-1 SPECIFICATIONS

Material per Injection — 12 ozs. • Plasticized Material per hour — 130 lbs. • Feed Hopper Capacity — 60 lbs. • Injection Piston Diameter — 2¾" • Injection Piston Stroke — 11½" • Hydraulic Injection Cylinder Bore — 13" • Pressure on Material — 22,500 PSI • Mold Closing Pressure — 400 Tons • Max. Mold Size — 18" x 25" • Max. Daylight — 30" • Min. Die Space — 6" • Max. Stroke — 24" • Oil Pump Capacity — 60 GPM @ 1000 PSI, Max. • Motor — 30 HP • Injection Stroke Time, for Filling Mold — 3.0 Secs. • Speed of Injection Piston, Forward — 120" per Min. • Heating Cylinder — 13,000 Watts • Height of Machine, Overall — 72" • Floor Space Required — 172" x 42" • Approx. Weight — 10 Tons.

SEND FOR NEW DE MATTIA CATALOG

It contains complete information and specifications on De Mattia Horizontal and Vertical Molding Machines and De Mattia Scrap Grinders.

MOLDING PRESSES • SCRAP GRINDERS • MOLD MAKING

DE MATTIA MACHINE and TOOL CO.

DE MATTIA MACHINE and TOOL CO.

NEW YORK SALES OFFICE 50 CHURCH ST. — CABLE ADDRESS: BROMACH, N. Y.
MIDWEST SALES OFFICE 189 WEST MADISON ST. CHICAGO 2, ILLINOIS

Tupper Seal, air and liquid tight flexible covers fit, and are included in the sets of all Tupperware Canisters.

The Tupperware 50 oz. Canister is "standard equipped" with the Tupper Seal, air and liquid-tight flexible Pour All cover.

The Tupper Seal, air and liquid-tight flexible Pour All cover is used on every Tupperware 20 oz. Canister.

The Tupper Seal, air and liquid-tight, Pour All cover as a cover for 46 oz. cans; Tupperware Sauce Dishes and other containers of metal, glass or pottery. Foods easily dispensed without removing entire cover.

The Tupperware Wonder Bowls are usually fitted with Tupper Seal, air and liquid-tight covers.

Argentine Patent 74,095 dated Dec. 14th, 1949 on invention covered by U. S. Patent 2,487,400 November 8, 1949. Canada Patent 463,387 Feb. 28th, 1950. Union of So. Africa Pat. 8,592 Sept. 21st, 1949. Belgium Pat. 491,293 Oct. 15th, 1949. Switzerland Patent 48,970 Sept. 23rd, 1949. Italy Patent 456,937 September 19th, 1949. Other U. S. and Foreign Patents Pending.

TUPPER! Seals

air and liquid-tight, flexible covers for Tupperware Tumblers, Canisters, Wonder Bowls, Cereal Bowls and many another container of glass, metal and pottery, the contents of which it is desired to keep fresh and wholesome.

TUPPER!

FORMAL NOTICE! 9th November, 1949

EXCLUSIVE!

U. S. Patent #2,487,400

The Tupper Corporation has attained a position of leadership in this industry by incurring great expense and expending painstaking effort in the development, design, manufacture and exploitation of its many world-known products.

The Tupper Corporation further has anticipated the inevitable attacks to which leadership is subject and has taken measures provided by law to preserve the creative rights to its products, methods and design by patent protection both in the United States and abroad.

Tupper Seals for Tupperware shown in this advertisement are just a few of the forms covered in this manner and are specifically covered by U.S. Patent #2,487,400.

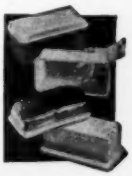
Only the Tupper Corporation, by U.S.Patent #2,487,400 has the right to make, use and vend container closures in connection with any and all types of containers throughout the United States and its territories as covered by the claims of the Patent.

Tupper Corporation will protect, according to law, the exclusive rights above granted

TUPPER CORPORATION

There's a Tupper Seal, air and liquid-tight flexible cover for Tupperware 2, 5, 8 and 12½ oz. Tumblers too, and these Tupper Seal, covers fit many other containers of metal, glass and crockery.

The Tupper Seal, air and liquid-tight flexible Pour Top cover, specially designed as a dispensing cover for specified diameters of containers holding foods such as syrups, salad dressings, catsup.



The cover of the Tupperware Bread Server which serves as a bread tray also is designed to give similar results as Tupper Seal, air and liquid-tight Flexible covers. Keeps contents fresh as no other such container.

When equipped with Tupper Seal, air and liquid-tight, flexible covers, Tupperware Cereal Bowls serve many another purpose.

The Tupper Seal, air and liquid-tight flexible cover made for Tupperware 8 oz. Tumblers also fits and is sold with all Tupperware Funnels as a base when funnels are used as storage containers.

TUPPER CORPORATION

Manufacturers of — CONSUMER, INDUSTRIAL, PACKAGING AND SCIENTIFIC PRODUCTS

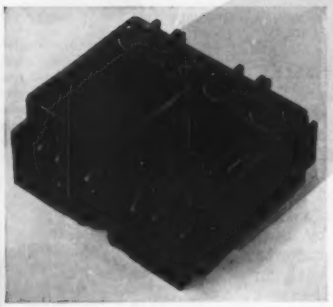
FACTORIES: Farnumsville, Mass., and Cuero, Texas New York Show Rooms 225 Fifth Ave.

ADDRESS ALL COMMUNICATIONS TO: Department B

COPYRIGHT TUPPER CORPORATION 1950

SQUARE D makes sure of PROFITS when they buy the press

The right molding press selection today will show itself in lower end-product cost to the last day the press is in service.



But the right selection cannot be of press alone . . . you must consider materials, auxiliary equipment, plant layout, mold design and many other factors which control your profits.

Square D, on Stokes recommendations, is equipped with 50-, 150-, and 300-ton compression and transfer molding presses for the manufacture of many parts, both simple and complex, of the widely used Square D electrical devices. High production, uniform excellence of product, long machine life with virtually uninterrupted service, and negligible maintenance characterize the Stokes installations at Square D.

Stokes has as many years of experience in molding practice as in building the presses with which to mold . . . experience freely available to you through the Stokes Advisory Service.

STOKES

STOKES MAKES
Plastics Molding Presses,
Industrial Tableting
and Powder Metal Presses,
Pharmaceutical Equipment,
Vacuum Processing Equipment,
High Vacuum Pumps and Gages,
Special Machinery.

F. J. STOKES MACHINE COMPANY, 5954 TABOR ROAD, PHILADELPHIA 20, PA.

Skillful Moldings by Industrial Plastics...

How Industrial Met Requirements for Chicago Electric Mfg. Co., Chicago, Ill.

Product: ICE CREAM FREEZER

Now everyone can enjoy real old fashioned ice cream without any extra labor. But, the problems of providing an ice retaining bucket for this product were not so simple. No. 1, it had to withstand below freezing temperatures without becoming brittle or subject to breaking. No. 2, it had to resist the salt action that brought about the freezing temperatures. No. 3, it had to have relatively good impact strength for household usage. The result: a deep cavity molding of sparkling white acetate produced by injection molding.

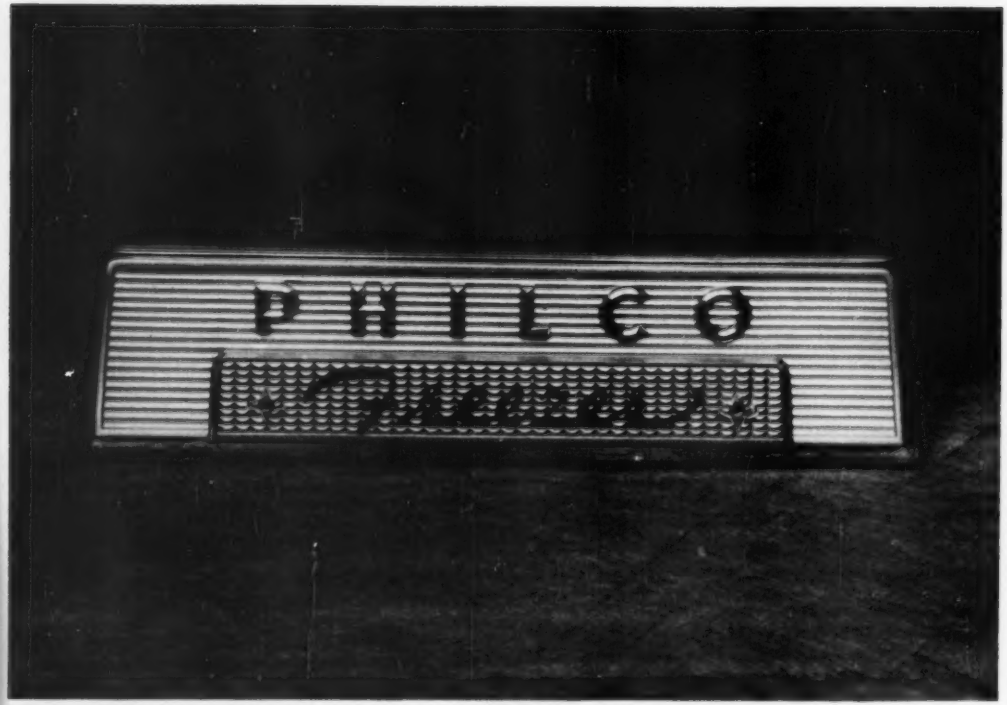
Industrial Plastics is ready to solve your problems of plastic molding with: Complete engineering and design service—Injection, compression or plunger transfer molding—assembly—painting—hot stamping and packaging. Just call, write or mail your prints for an estimate.

In the course of years, many leading manufacturing organizations have learned to depend upon the design and molding services of Industrial Plastics for prompt, economical fulfillment of their requirements involving the use of plastics. Whenever your company needs this sort of service, ask us to confirm what we can do for you. No obligation.

Serving the Greatest Names in Industry

Industrial Plastics Co.
A Division of INDUSTRIAL ABRASIVES INC.

1829 S. 55th Avenue Chicago 50, Illinois



PLASTICS FOR INDUSTRY

The above illustration shows the Acrylic nameplate currently being produced for PHILCO and used on their 1951 refrigerator line.

The actual size is 10" x 2-1/2", molded in a two-cavity die and decorated by CRUVER'S "Bas-Releef" Process in transparent red for the word "Freezer", gold lacquer in the panel around the word "Freezer", the word "Philco" in bright-gold and the balance of the background in aluminum lacquer.

It is colorful, decorative and also another example of CRUVER'S "Bas-Releef" work for the appliance industry.

CRUVER

MANUFACTURING CO.

2460 W. JACKSON BLVD., CHICAGO 12, ILL.

BRANCH OFFICES

DETROIT MINNEAPOLIS NEW YORK

CLEVELAND ST. LOUIS

40-50 degrees higher heat distortion point in Plio-Tuf

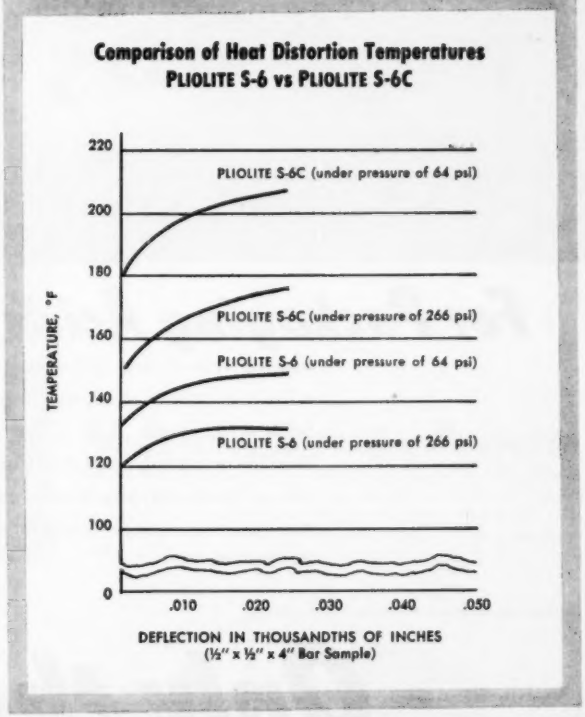
—made with new Pliolite S-6C

Now you can get all the advantages of PLIO-TUF—impact resistance, hardness, rigidity, chemical resistance, water resistance, machinability, good electrical properties — PLUS greatly improved resistance to distortion by heat. Thanks to a new Goodyear-developed resin—called PLIOLITE S-6C—you're assured of heat distortion points from 40° to 50° higher.

New temperature ranges in the 190°-200° F. range give you higher heat resistance in the finished item, and let your finished molded products cope with a wider range of operating conditions—yet with no sacrifice to the outstanding physical properties of PLIO-TUF.

PLIO-TUF is a use-proved combination of resin and rubber—already in full use by makers of such diverse items as helmets, textile spools, golf ball covers, carrying cases, bowling pin covers, chemical buckets and a wide range of molded items. For help in fitting PLIO-TUF into your present or future plans—samples for your evaluation—full details about this outstanding production material, write to:

Goodyear, Chemical Division
Akron 16, Ohio

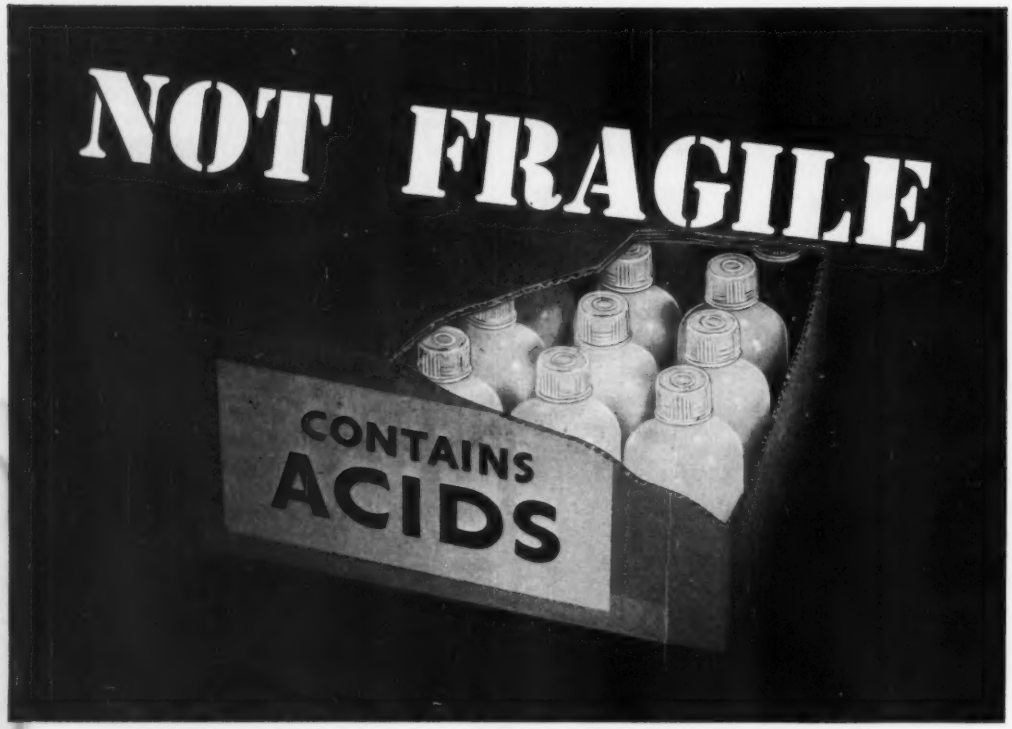


HIGHER HEAT DISTORTION POINT *than with any other high styrene butadiene copolymer is shown in tests of* PLIOLITE S-6C *on Tinius-Olsen Heat Distortion Tester. Chart compares results of similar tests on* PLIOLITE S-6.

USE PROVED *Products*

GOODYEAR

Plio-Tuf, Pliolite—T. M.'s The Goodyear Tire & Rubber Company, Akron, Ohio



For Packaging Acids so that they can be shipped, stored and handled without fear of breakage, on the ground or in the air. Need to get a highly corrosive or expensive chemical somewhere in a hurry? The Plaxpak bottle is the answer. Take it high in the sky. Unequal pressures will cause it to flex, but not break or pop its closure. Drop it on the ground. It will bounce, but not break. Shipping weights are drastically reduced. When compared empty, the Plaxpak bottle is one-fifth the weight of glass; when filled, one-half the weight.

Only the best is

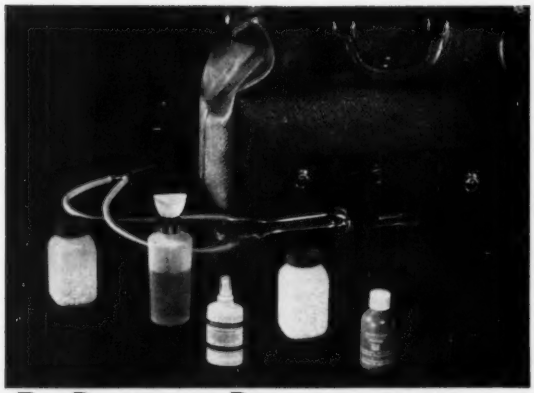
OTHER EMHART PRODUCTS INCLUDE:

AUTOMATIC PACKAGING EQUIPMENT
STANDARD-KNAPP
Division of Emhart Mfg. Co.
PORTLAND, CONNECTICUT

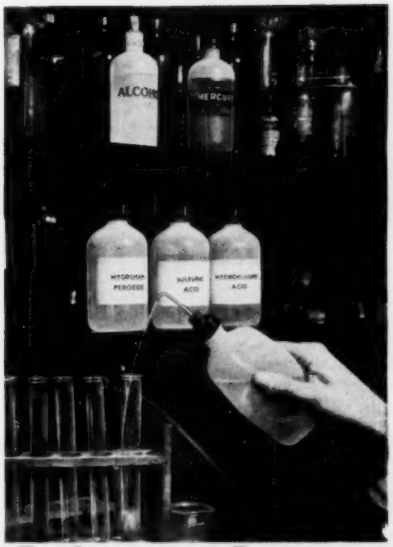
GLASS MAKING MACHINES
HARTFORD-EMPIRE CO.
Division of Emhart Mfg. Co.
HARTFORD 2, CONNECTICUT

HIGH SPEED AUTOMATIC PRESSES
HENRY & WRIGHT
Division of Emhart Mfg. Co.
HARTFORD 5, CONNECTICUT

PREMIUM QUALITY STAMPING PRESSES
THE V & O PRESS CO.
Division of Emhart Mfg. Co.
HUDSON, NEW YORK



For Packaging Pharmaceuticals in liquid or powder form, the Plaxpak bottle offers the triple advantages of unbreakability, lightweight and, where desired, controlled dispensing as a spray, stream or droplet. Shown above are some stock bottles for medicinal use.



For Laboratory Research the Plaxpak bottle provides the convenience of an unbreakable, chemically inert container, and the added advantage of controlled dispensing. The stream dispensing fitment shown above was developed by S. H. Ansell & Sons, Boston, Mass.

For Boosting Turpentine Production

the Plaxpak bottle has proven an invaluable aid. It is used as a container for sulfuric acid, which is squirted into "wounds" in the tree to increase sap flow. Safe, easy to handle and inert to the acid, the Plaxpak bottle speeds up operations, vastly increases manhour output and helps to lengthen tree productivity.

good enough

HELPFUL PLAX LITERATURE

Catalogs on Plaxpak bottles and other Plax products are available on request. Also available is a booklet "Fabrication of Polystyrene."

PLAX CORPORATION

Subsidiary of Emhart Mfg. Co.

P. O. BOX 1019, HARTFORD 1, CONN.

In Canada, Plax Canada, Ltd., Toronto

Sales Offices: New York City, Syracuse, Philadelphia, Cincinnati and Chicago.

Plax blow-molded products are made under the following U. S. Pats.: 2128239, 2175053, 2175054, 2230190, 2260750, 2283751, 2349176, 2349177, 2349178, 2230188. *Reg. U. S. Pat. Off.

PLASTICS MACHINERY BULLETIN

Reporting News and Machine Design Developments

IN BUSINESS TO **NRM** REDUCE YOUR COSTS

NYLON—New NRM Extruders handle Nylon, other plastics

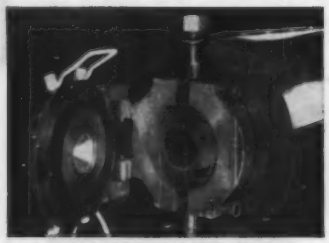
New NRM electrically heated Extruders offer you a valuable plus—with them you can extrude Nylon as well as a variety of other plastics in various forms. With versatile-NRM Extruders, producers often avoid purchase of extra equipment.

Standard NRM Models of the new design can be adapted simply and easily in the field, by removing the standard die or crosshead, and substituting a special Nylon die or crosshead. The steps required are shown below.

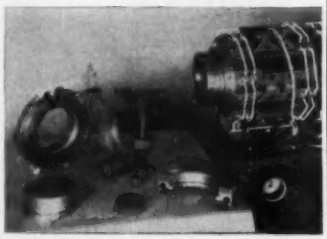
NRM's Nylon Extruders range from a completely self-contained 1"-screw bench model, up through 3½"-screw machines, and larger, if desired. They are currently being used for wire covering and a variety of other applications.

Write for full information to Plastics Machinery Division, National Rubber Machinery Company, Akron 8, Ohio.

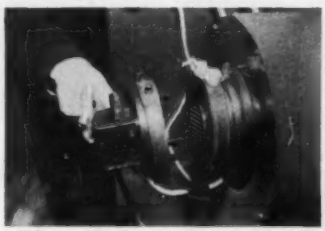
1. New standard 2½" electrically heated NRM Extruder, as furnished for general plastics materials. Two blowers provide balanced heat control.



2. Die gate swings open easily on hinges. The new front flange is split for easy removal.



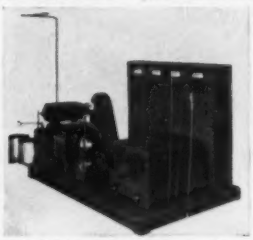
3. Standard die gate, subdie, strainer plate, and front end removed from extruder. Note cylinder heater shells and blower for balanced heat control.



4. Nylon crosshead or die is positioned for bolting directly to cylinder face. This avoids critical temperature variations from heat loss of flange.

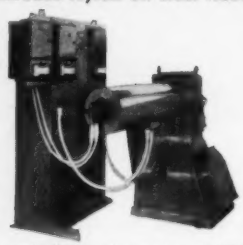
5. NRM Extruder set up for covering wire with Nylon. Wire is fed down through preheater to extruder. Covered wire is cooled in water tank under extruder head, is then ready for winding.

Self-contained Nylon Extruder



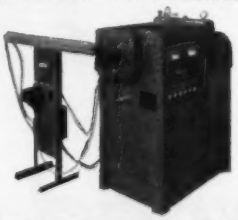
This 1" NRM bench model is a completely self-contained unit for Nylon covering of wire, sizes B & S Gauge #24 to #36. Unit includes electrically heated extruder, let-off, cooling tank, spark tester, dual capstan, dual take-up, and instrument and control cabinet.

Extrudes Nylon on steel ribbon



Wide application is characteristic of NRM Extruders. This 2½" model is used to cover a thin steel ribbon with Nylon to produce corset stays. In this unit feed is horizontal. Replacement of heads is simple matter.

Nylon Extruder with horizontal feed



NRM 1½" Extruder arranged for horizontal feed of wire through preheater. Only NRM Extruders provide balanced heat control, with absolute control over frictional heat. This feature is self-contained, requires no pipe connections for compressed air, oil, or water.

NATIONAL RUBBER MACHINERY CO. General Offices & Engineering Laboratories, Akron 8, Ohio

PLANTS at Akron and Columbiana, Ohio and Clifton, N. J.
AGENTS East: National Rubber Machinery Co., Clifton, N. J.
West: S. M. Kipp, Box 441, Pasadena 18, Calif.
EXPORT Plastics Machinery: OMNI EXPORT CORPORATION
460 4th Ave., New York 16, N. Y.

Creative Engineering

Cabinet molded for Zenith Radio Corp., Chicago

Skillful Molding Creates

ITS NEWEST CABINET MEMBER

This cabinet which we molded for Zenith's new "Tip Top Holiday" portable is the latest in a long line of plastic cabinets molded by Mills. In shape—size—color—these cabinets have varied as widely as the products for which they were made.

All were alike however in one respect. Each was engineered and molded so that its attractive, sales appealing appearance was matched by sturdy durability.

The fact that we received additional cabinet molding jobs as well as other molding orders from the same clients proves we can be depended upon for top quality every time.

Let us show you today how our unique combination of sound engineering—careful, correct material selection and skillful molding can create a better plastic product for you.

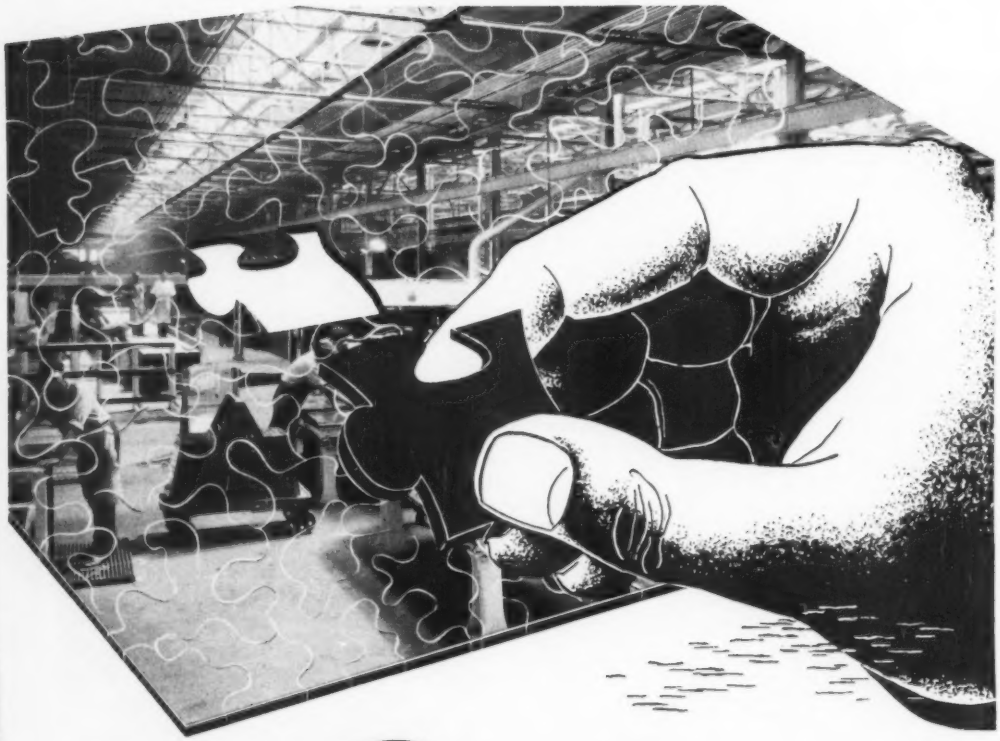
Write on your letterhead for the new Injection Molded and Extruded Plastics Catalog. Or, for detailed information about CHILO PLASTIC piping, tubing and fittings, write for circulars containing data and illustrations.*

**Trademark registered*

ELMER E. MILLS CORPORATION

INJECTION MOLDERS and EXTRUDERS of: Tenite, Lumarith, Plastacele, Fibestos, Lucite, Nylon, Plexiglas, Polystyrene, Styron, Loalin, Vinylite, Geon, Plexene, Polyethylene, Cerex, Forticel, CHILO PLASTIC*, Saran, and other Thermoplastic Materials.

2930 NORTH ASHLAND AVENUE • CHICAGO 13, ILLINOIS



investigate... *Plastics* **molded by MPc**

TO COMPLETE YOUR PRODUCTION PICTURE

If your production is hampered by the scarcity of metals or other materials...*investigate plastics molded by* **MPc.** Today...with **MPc's** huge multi-thousand ton presses...it is possible to mold housings, shaped panels, structural members, etc. with greater areas, greater weight, and for greater strength. New molding techniques developed at **MPc** utilize the amazing new molding materials to make plastics perform in hitherto unsuspected ways. At **MPc** the challenge of the unusual is met with a spirit of enterprise and inventive engineering skill...supported by unmatched molding and tool-room facilities. Submit your plastics molding problem to MOLDED PRODUCTS CORPORATION, 4535 W. Harrison Street, Chicago 24, Illinois.

PLASTICS DIVISION
MOLDED MPc PRODUCTS
CORPORATION

..Pace-Makers in Plastics Molding

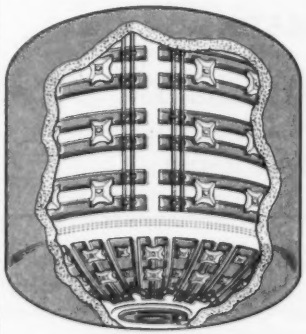
FREE "Data Book of **MPc** Facilities," an engineering-eye view of **MPc** press capacities and other production facilities...together with a survey of **MPc** special skills available for your use. *Write for your copy.*

Industry's Most Versatile Heat Source

Chromalox *Electric* Strip Heaters

Easy to Install CHROMALOX Electric Strip Heaters give clean, dependable and accurately controlled heat where and when heat is needed. They produce uniform and accurate temperatures by automatic or manual controls. Low initial costs, low installation costs and low operating costs are among the many advantages of using CHROMALOX Strip Heaters for heating liquids, gases, viscous fluids, tanks, platens, molds, moving parts, etc. Get the full details now.

A Typical Strip Heater Application from Our Files



Rugged, easily installed Chromalox Strip Heaters assure accurate temperature, dependable around-the-clock service.

Strip Heaters curved lengthwise at the factory fit snugly to tank perimeter and . . .

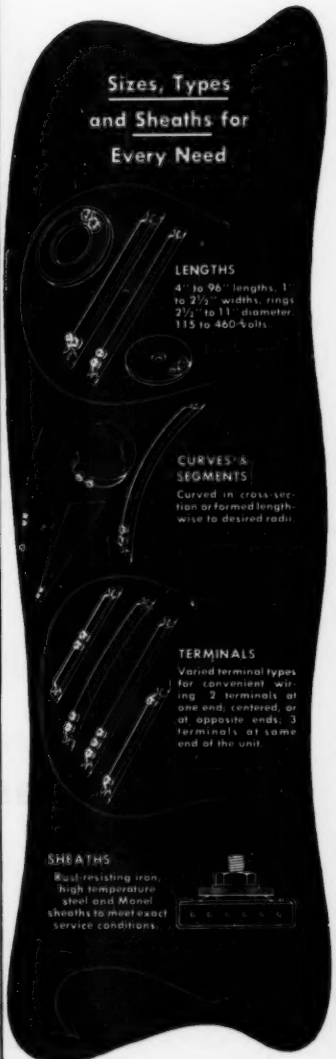
Strip Heaters curved slightly as installed conform to shape of convex kettle bottom, while . . .

Segment Heaters fill the gaps.

IC-59

CHROMALOX

Electric Heat for Modern Industry


Sizes, Types and Sheaths for Every Need
LENGTHS
4" to 96" lengths, ⅜" to 2½" widths, rings 2½" to 11" diameter. 115 to 460 volts.
CURVES & SEGMENTS
Curved in cross-section or formed lengthwise to desired radii.
TERMINALS
Varied terminal types for convenient wiring. 2 terminals at one end, centered, or at opposite ends; 3 terminals at same end of the unit.
SHEATHS
Rust-resisting iron, high temperature steel and Monel sheaths to meet exact service conditions.

Want Ideas?

on how to use Chromalox Electric Heaters in your plant

Write for the data-packed Catalog 50 which describes many types of Chromalox Electric Heaters and how to apply them. It's yours without obligation.

EDWIN L. WIEGAND COMPANY
7503 Thomas Blvd., Pittsburgh 8, Pa.

3rd INTERNATIONAL PLASTICS EXHIBITION

TURIN
(ITALY)

SEPTEMBER 22nd
- 1951 -
OCTOBER 7th

3rd International Plastics Congress

Subject: "Standardization of articles manufactured from plastics"

On the occasion of the 3rd International Plastics Exhibition, the *3rd International Plastics Congress* will be held in Turin from October 1st to October 4th, with the approval of the A.S.A. (I.SO.61).

SUMMARIES OF THE COMMUNICATIONS
should reach the Secretary of the Congress
—Turin—5, Via Cavour—
on or before July 30th, 1951

For information, accommodation bookings, etc. please apply to the "Secretary of the 3rd International Plastics Congress"—Turin (Italy) 5, Via Cavour. Telephones: 55.34.23 and 52.11.84

with the 3rd INTERNATIONAL PLASTICS EXHIBITION
also the *INTERNATIONAL TECHNICAL EXHIBITION*

chooses KOPPERS POLYSTYRENE 81 for a new molding technique

RECENTLY, Scripto engineers developed a new injection molding technique which simplifies manufacture of the Scripto pencil. In the past, the pencil was made of metal, and many separate operations were required to form and tip the pencil barrel. Now, the pencil barrel is injection molded. Internal threading is accomplished by use of long, narrow, retractable cores. When the molding cycle is complete, the cores are retracted. The barrels are threaded and completely formed in this one simple operation. This new technique means faster production, lower cost and a better product.

Scripto engineers found that the excellent molding qualities of Koppers Polystyrene 81 were unequalled for this delicate operation. Its dimensional stability and ease of molding make possible faster cycles and fewer rejects. And its clean, brilliant colors add to the appeal of the finished product.

Technical data on the molding characteristics of Koppers Polystyrenes are available upon request. As always, we want to work with you to obtain the best results from your use of plastic molding materials . . . to solve your particular molding problems (with special attention to military end uses) . . . and to design new products to be made from Koppers Polystyrene when the supply situation again becomes more normal.

KOPPERS

Koppers Plastics

Koppers Polystyrene has made Many Products Better and Many Better Products Possible.

KOPPERS COMPANY, INC., Chemical Division, PITTSBURGH 19, PA.

SALES OFFICES: NEW YORK • BOSTON • PHILADELPHIA • CHICAGO • DETROIT • LOS ANGELES

Little

does he know...

AND little would he care, for that matter, that his favorite toy auto is made from scrap plastic left over from refrigerator freezer compartment doors.

But there's a man who *does* know and *does* care. He's the toy manufacturer who has discovered what DPi high vacuum coaters can do for his sales curve. In these coaters, he can put a beautiful metal lustre on just about any plastic product. It makes no difference if he uses a reclaimed plastic that's a bit off-color, because it's covered beautifully by its new metal coat. And cost-savings are obvious.

With the prospect of a plastics scarcity facing us, this idea of metallizing scrap plastic takes on added importance. In many cases, it may mean the difference between having and *not* having a product to put on the market!

Products already using this high vacuum metal-coating process range all the way from toys and emblems to radio housings, flashlight reflectors, and light-switch shields. The idea, naturally, also has important scientific and engineering applications these days, apart from decoration.

If you'd like to know more about the DPi coating equipment that makes all this possible, write for our new data sheet which gives the engineering details. That, and an article discussing the technique and economics of metal coating on plastics are yours for the asking. Write ***Distillation Products Industries,*** Vacuum Equipment Dept. 779 Ridge Road West, Rochester 3, N.Y. (Division of Eastman Kodak Company).

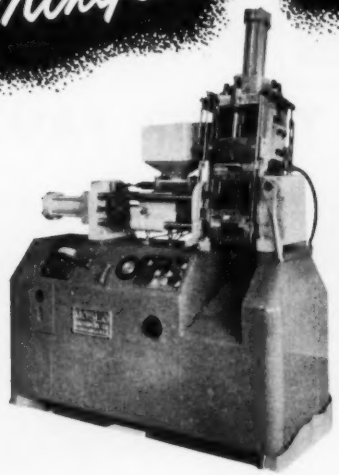
high vacuum research

and engineering

DPi

Also...vitamins A and E...distilled monoglycerides...more than 3400 Eastman Organic Chemicals for science and industry

MOSLO *Minijectors*



PROVIDE *High Speed* PRODUCTION WITH SMALL DIE EXPENSE

Save the cost of expensive dies and decrease your operational expenses with a Moslo Minijector molding machine. In many cases these small, high speed Minijectors will out-perform larger machines—for molding small pieces and parts.

Moslo Minijectors are available up to 4 ounce capacity and incorporate many special features. For example, there is an automatic slow down when the mold clamp closes . . . if part fails to be ejected the machine will stop automatically. These and many other reasons are why more and more molders are learning a Moslo Minijector will help break bottlenecks and speed production.

We invite your inquiry — for complete information write today.

TERRITORIES OPEN FOR DISTRIBUTORS

MOSLO MACHINERY COMPANY
2443 PROSPECT AVENUE • CLEVELAND 15, OHIO

INTRODUCING

Colorblende AND *Dispersa*

The Newest Names In

Dry Colorants

Mid-America Plastics, Inc., is operating its Dry Color Division under full production. A completely equipped laboratory and modern manufacturing facilities formulate and compound "Colorblende" the dry colorant, and "Dispersa" the wetting agent. You can get immediate delivery of "Colorblende" in 17 Bureau of Standards colors or specify any special colors.

We invite your inquiry—write today for our price list and Color Comparison Chart. Upon request we will send without charge a sample of any standard color of your choice. "Colorblende" and "Dispersa" are packaged in convenient containers — in 50# or 100# units ready to color your crystal styrene in any mixing drum.

Quick — Easy — Dust Free — Economical

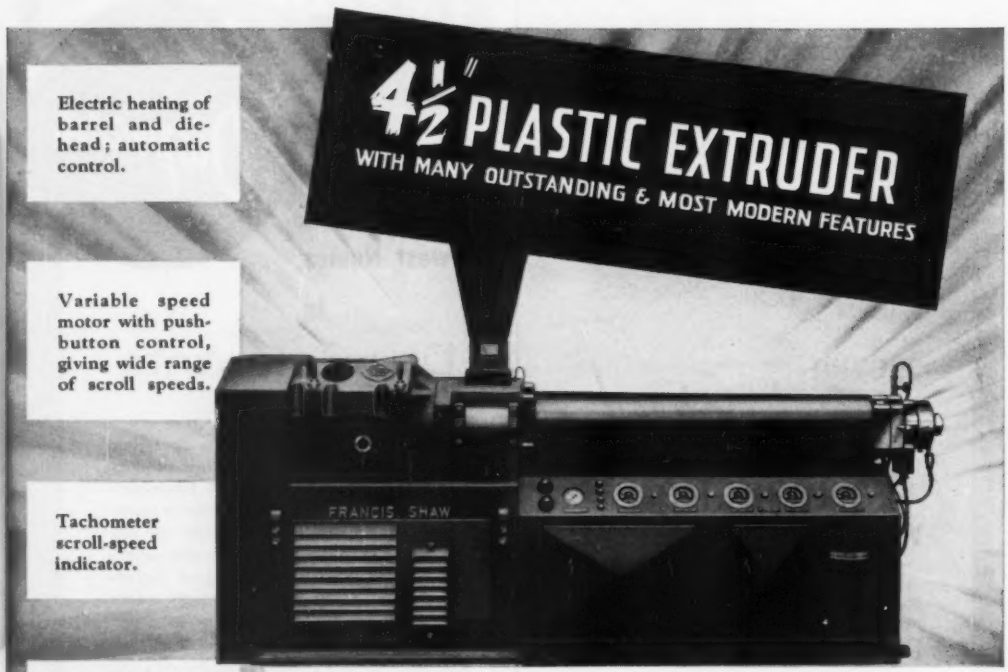
TERRITORIES OPEN FOR DISTRIBUTORS

MOSLO ENTERPRISES

MID-AMERICA PLASTICS, INC.
COLOR DIVISION
2443 PROSPECT AVE. • CLEVELAND 15, OHIO

A new SHAW arrival

THE LATEST ADDITION TO OUR FAMILY



Electric heating of barrel and die-head; automatic control.

Variable speed motor with push-button control, giving wide range of scroll speeds.

Tachometer scroll-speed indicator.

Water-cooled feed hopper and scroll.

Supplied with or without roller feed.

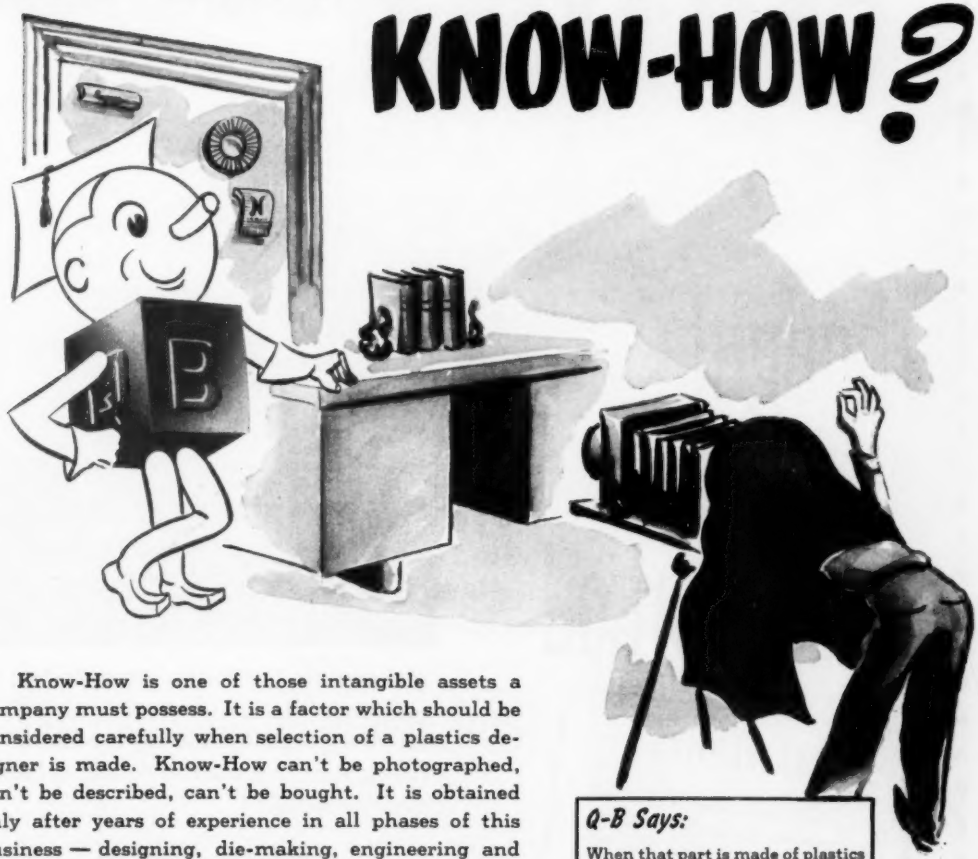
BRITISH MADE

Every practical user will like the features of the latest range of SHAW Extruders for plastic materials such as polyvinylchloride, acetate, polystyrene etc. The careful choice of materials from which they are made means long life and dependable working without shut-down.

FRANCIS SHAW & COMPANY LIMITED
MANCHESTER 11 · ENGLAND

R 214.

HOW CAN YOU PHOTOGRAPH KNOW-HOW?

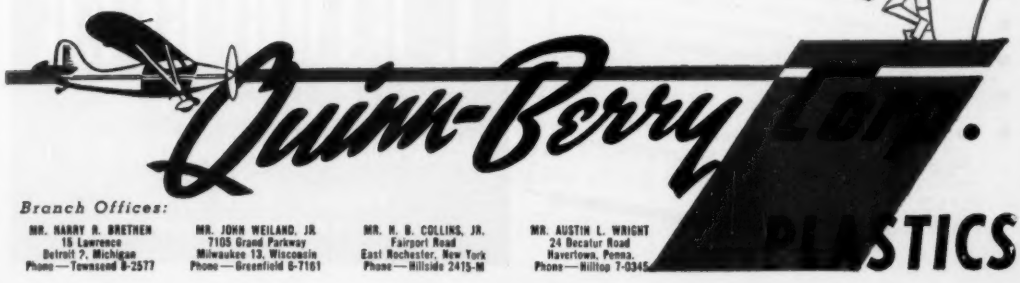


Know-How is one of those intangible assets a company must possess. It is a factor which should be considered carefully when selection of a plastics designer is made. Know-How can't be photographed, can't be described, can't be bought. It is obtained only after years of experience in all phases of this business — designing, die-making, engineering and molding. We have been working closely with manufacturers in many industries. We have solved a number of difficult problems for them. We think we can help you.

Q-B Says:

When that part is made of plastics
You may want to make a test
Just call on us
And without any fuss
We'll see that you
get the best!

QUINN-BERRY CORP
2656 West 12th Street
ERIE, PENNSYLVANIA



Branch Offices:

MR. HARRY R. BRETHEN
15 Lawrence
Detroit 7, Michigan
Phone — Townsend 8-2577

MR. JOHN WEILAND, JR.
7105 Grand Parkway
Milwaukee 13, Wisconsin
Phone — Greenfield 6-7161

MR. H. B. COLLINS, JR.
Fairport Road
East Rochester, New York
Phone — Hillside 2415-M

MR. AUSTIN L. WRIGHT
24 Decatur Road
Havertown, Penna.
Phone — Hilltop 7-0345

PLASTICS SCRAP

bought sold reworked

OUR SERVICE

As the world's leading Plastics Scrap Reclaimers we offer the almost unlimited facilities of our vast plant to industry in these days of shortages in all basic raw-materials.

We have available over 150,000 sq. ft. of floor space devoted exclusively to the processing of plastics — virgin and scrap — resinous materials or by-products.

We specialize in the reduction to small particles — to your most exacting specifications — of all lumps, blocks, mill ends, bleeder waste — regardless of size and whether rigid or soft.

We also custom-compound *all* thermoplastics to your specifications.

We offer
the World's finest facilities for:
RECLAIMING • REPROCESSING
RECOMPOUNDING • RECOLORING

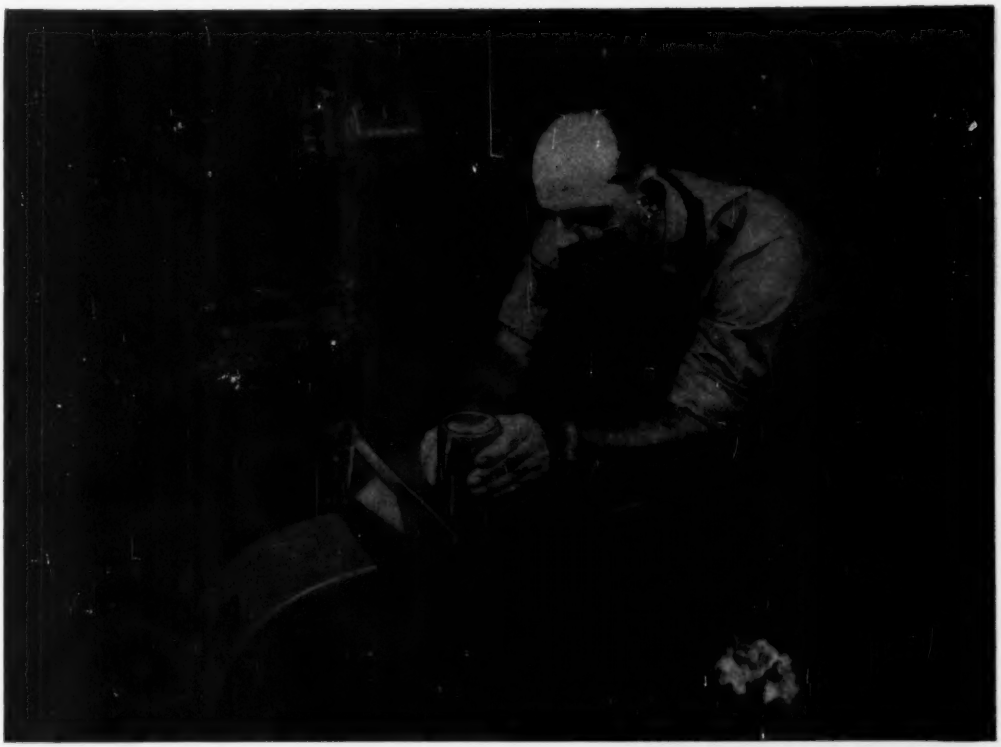
We reprocess *Your* Plastics Scrap, By-Products, Surplus for *Your* own Re-Use.
We have complete laboratory facilities for Testing, Analyzing, and Pilot Running of Customer's Materials.

GRANULATING • PELLETIZING
CHEMICAL FLOTATION • WASHING • CLEANING • DRYING
SEPARATION OF CONTAMINATED MATERIALS
REMOVAL OF FOREIGN MATTER
COMPOUNDING • MIXING • COLORING • EXTRUSION

UNLIMITED KILN DRYING FACILITIES

A. BAMBERGER

CORPORATION
PLASTICS MATERIALS
703 Bedford Avenue, Brooklyn 6, N. Y.
Phone: MAin 5-7150
CABLE: CHEMPROD BROOKLYN

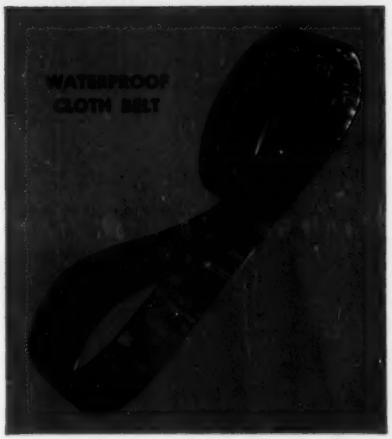


You can step up production!

You'll find a steady, high rate of production maintained at low unit cost when you install Waterproof Cloth Belts by CARBORUNDUM for wet sanding of plastics. Here are some "reasons why":

- Smooth running splices, with "splice throb" eliminated.
- Consistent cutting rate through extended belt life.
- Less down time for tensioning adjustments, with "wet stretch" retarded.
- Superior finish produced in minimum contact time.

See your CARBORUNDUM salesman or distributor about these and other outstanding advantages of Waterproof Cloth Belts by CARBORUNDUM. Or write Dept. MP 82-117 for full details.



Only CARBORUNDUM

TRADE MARK

"Carborundum" is a registered trademark which indicates manufacture by The Carborundum Company, Niagara Falls, N.Y.

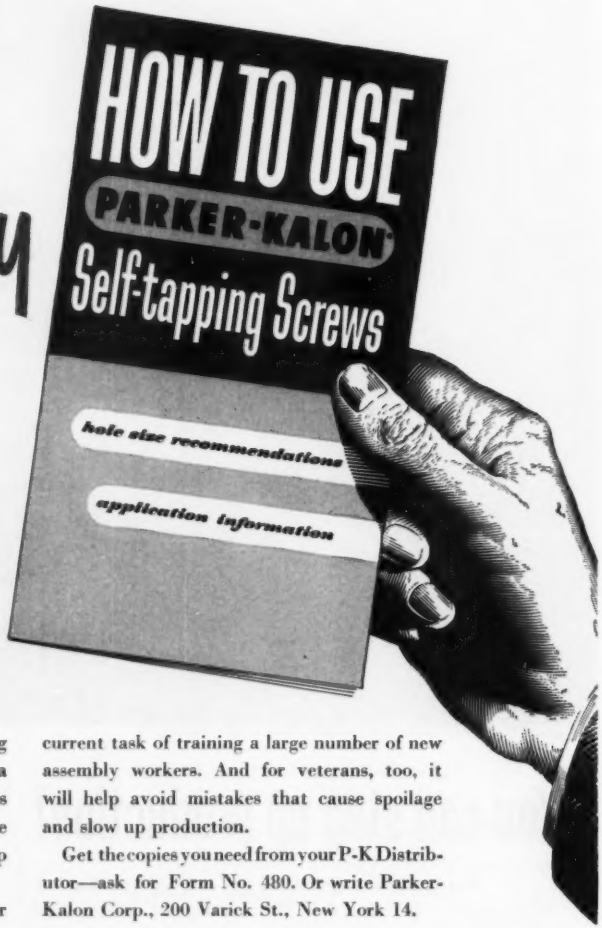
makes ALL Abrasive Products ...to give you the proper ONE

82-117

Now Ready

a new, revised edition of this popular P-K

ASSEMBLY HANDBOOK



Here are the essentials of P-K Self-tapping Screw selection and use, condensed into a 24-page, pocket-size reference booklet. This new edition is redesigned and improved to give you all the information you need, and help you find it faster.

It's ready just in time to help you with your current task of training a large number of new assembly workers. And for veterans, too, it will help avoid mistakes that cause spoilage and slow up production.

Get the copies you need from your P-K Distributor—ask for Form No. 480. Or write Parker-Kalon Corp., 200 Varick St., New York 14.

Tells WHERE to use WHAT P-K Self-tapping Screw in Metals or Plastic

Gives Hole Sizes and Application Data for all types of P-K Screws

IF IT'S P-K IT'S O.K.

The Original

PARKER-KALON® SELF-TAPPING SCREWS

A TYPE AND SIZE FOR EVERY METAL AND PLASTIC ASSEMBLY

±.004? ±.002? ±.001?

Whatever the tolerances you need, we can work within them!

We have the experience, the facilities, the skill to turn out intricate, accurate moldings. During World War II, for example, Prolon made plastic parts for the Proximity Fuse, a job requiring skilled precision molding. Continuously for the past 10 years, we have been producing battery cases for use in Air Force planes.

Today, *as of now*, we are ready to go right into production on other defense projects. No waiting period for training personnel and adapting facilities! We have room to expand, if desired, and unlimited power is available. Our engineering department has the technical and practical experience necessary to advise on designs, on correct choice of plastic materials, on efficient molding methods, compression or injection. We make our own molds.

Whether your requirements are defense or civilian production, a letter, a wire, or a telephone call will bring one of our planning engineers to your office. No obligation.

THERE IS
NO SUBSTITUTE
FOR PLASTICS

PROLON PLASTICS

PLANNING • DESIGNING • DIE MAKING • MOLDING
FOR CIVILIAN OR DEFENSE PRODUCTION

PROLON PLASTICS, A DIVISION OF PRO-PHY-LAC-TIC BRUSH COMPANY, FLORENCE, MASS.

Chemicals you live by

2 MONEYMAKERS...

FOR VINYL COMPOUNDING

Chlorowax 40* and Surfex* can be used separately or in combination to lower vinyl compounding costs and increase batch yields with no sacrifice in quality. Chlorowax 40 is DIAMOND ALKALI's liquid chlorinated paraffin which has proved highly satisfactory as a low-cost co-plasticizer. Surfex is one of DIAMOND's precipitated calcium carbonates—a reagent extender of high uniformity and purity.

The table indicates how these two DIAMOND chemicals may be applied in vinyl compounding to produce two-way savings. Specific formulas are available through your nearest DIAMOND Sales Office.

*®

	PARTS	
PVC RESIN	100	100
PRIMARY PLASTICIZER	52	47
*CHLOROWAX 40**	—	15
STABILIZER	3	3
STABILIZER—LUBRICANT	0.5	0.5
*SURFEX**	—	15
TOTAL	155.5	180.5
ESTIMATED MATERIAL COST LB./VOL.	45.8¢	41.6¢
YIELD—% INCREASE PER LB. OF RESIN		(By Vol.)
HARDNESS	85A	85A
TENSILE STRENGTH	2600 psi	2600 psi
ELONGATION	375%	375%
100% MODULUS	1400 psi	1400 psi
CRESCENT TEAR	375 lbs./in.	375 lbs./in.
BRITTLENESS—TEMPERATURE	-31°C	-29°C
HEAT LOSS	5.5%	4.7%

DIAMOND SALES OFFICES: New York, Philadelphia, Pittsburgh, Cleveland, Cincinnati, Chicago, St. Louis, Memphis and Houston. Also representatives in other principal cities.

DIAMOND CHLOROWAX 40 AND SURFEX

DIAMOND ALKALI COMPANY...CLEVELAND 14, OHIO

DIAMOND ALKALI CHEMICALS

Challenge Clopay plastic extrusions to do your job!

CLOPAY ..... research has found a revolutionary way to produce precision plastic extrusions with material characteristics of the widest versatility.

Round, flat or unusual shapes in a complete range of colors . . . low and high temperature properties . . . hard or soft with required degree of toughness and dielectric strength to meet the most exacting specifications . . . any combination to satisfy difficult requirements for gaskets, mouldings, tubing, electrical insulation and other uses.

*Clopay Vinyl extrusions are an authentic improvement over rubbers (natural or synthetic) — not a substitute.

Thermoplastics in any extrudable profile

- RODS
- TUBES
- RIBBONS
- CHANNELS

to meet your exact specifications

INDUSTRIAL PRODUCTS DIVISION

CLOPAY CORPORATION

OUTLINE YOUR PROBLEM on the handy coupon below and mail to Industrial Products Division, Clopay Corporation, Clopay Square, Cincinnati 14, Ohio.

ADDITIONAL CLOPAY SERVICES FOR INDUSTRY

1. Fabrication of vinyl film, supported and unsupported, and Polyethylene film for specialized uses.
2. Vinyl coating of papers and textiles.
3. Multi-color printing (surface and rotogravure) of plastics.
4. Precision slitting, electric eye-controlled cutting, die cutting, electronic and thermal sealing, and high speed production line sewing of plastics.
5. Complete Laboratory and Engineering facilities for research and development.

DEPT. MP-8 CLOPAY CORPORATION Clopay Square, Cincinnati 14, Ohio

DIAGRAM:

SPECIFICATIONS:

Name_____ Title_____

Name of Firm_____

Address_____ City_____ Zone____ State_____

IDDON BROS. LTD.

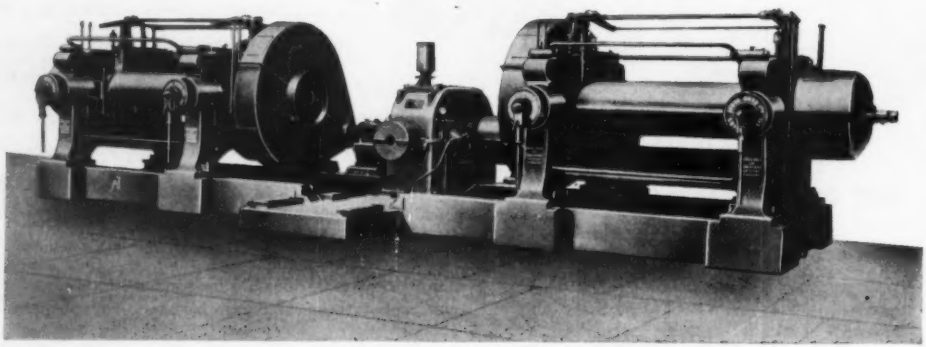
TELEPHONE
LEYLAND-81258/9

LEYLAND, ENGLAND

GRAMS:
'IDDON' LEYLAND

MAKERS OF

MACHINES FOR THE PLASTICS INDUSTRY



Battery of Two Single Geared Mixing Mills with water cooled bearing blocks and back shaft drive. Arranged for motor drive through spiral bevel and double helical gear unit. Rolls 20" diameter x 60" face.

OVER 60 YEARS EXPERIENCE

IN THE DESIGN AND MANUFACTURE OF

CALENDERS — MILLS — PRESSES — EXTRUDERS — Etc.

ENABLES US TO OFFER A RANGE OF MACHINES WITH A SALES RECORD BUILT ON COMPARISON

Their job is to solve your problems

Use the Monsanto Technical Council

These ten plastics experts and specialists —The Monsanto Technical Council—have a range of experience that *blankets* the plastics field. With more than 100 years combined experience that covers almost every type of plastic material and process, these men *offer you ten approaches to your problem.*

Monsanto invites you to send in your questions, simple or complex... problems in materials, methods, techniques, costs, or styling. We'll be glad to help you solve them. There's no cost, no obligation. For more information about the Monsanto Technical Council and how it works, send for our free booklet: "Ten Heads Are Better Than One."

Remember, too, that Monsanto produces a wide range of plastics... the largest "family of plastics" in the industry. So, whatever your application, chances are there's a Monsanto plastic *best* suited to your needs.

For our free booklet, "Ten Heads Are Better Than One," and for more information on Monsanto's big *family* of plastics, please send the handy coupon.

MONSANTO
CHEMICALS – PLASTICS

SERVING INDUSTRY... WHICH SERVES MANKIND

MONSANTO CHEMICAL COMPANY, Plastics Division,
Room 2608, Springfield 2, Mass.

☐ Please send me your booklet, "Ten Heads Are Better Than One" about the Monsanto Plastics Technical Council.
☐ Please send me information on the big Monsanto family of plastics.

Name & Title _____

Company _____

Address _____

City, Zone, State _____

Why Not "Length of Service" Pins for Customers?

The trouble is the expense—the pin would have to be costly if it were to symbolize the care and quality and pride we put into our molding of plastics—and there would have to be an awful lot of pins.

However, the idea has merit—what better recommendation can you find for a molder than a group of outstanding firms who have dealt with him for 10, 15 and 25 years? We find particular satisfaction in those who for one reason or another had left our fold and finally came back with a sigh of relief.

For over 30 years we here at Boonton have been a mainstay for both large and small manufacturers who depend on quality molded plastics for certain phases of their business.

So, next time you are in need of molded plastics—and need a dependable source—why not check with us?

BOONTON MOLDING CO.
BOONTON, NEW JERSEY
N. Y. Office—Chanin Bldg., 122 East 42nd Street,
Murray Hill 6-8540

For close temperature control and accurate gauge FARREL MILLS give you . . .
ROLLS which, in addition to being chamber-bored, are drilled longitudinally through the shell to provide more effective temperature control and greater uniformity of temperature across the entire roll face.
ROLL ADJUSTMENT that is motor-operated for quick and accurate control of gauge while the batch is on the mill, with vernier dial indicators to show roll movement in thousandths of an inch.
HOUSINGS made of high-strength Meehanite® metal, amply proportioned to withstand peak loads and shock.
JOURNAL BOXES made of Meehanite metal, full-bronze-lined, water-cooled and flood-lubricated for high-temperature operation.
MILL ROLL
ADJUSTING SCREW
HOUSING
JOURNAL BOX

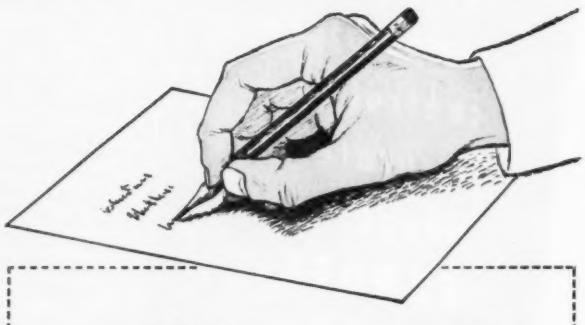
Farrel-Birmingham is prepared to engineer a mill with any combination of design features and attachments necessary to fill your needs. Physical proportions, method of heating or cooling the rolls, gauge control, prevention of stock contamination — in fact, every detail of construction can be worked out to fit your requirements.

Furthermore, almost any "special" mill can be furnished from existing drawings and patterns — because, in a century of building processing machinery, Farrel-Birmingham has designed mills for almost every conceivable application. This means that, ordinarily, you can obtain the exact mill you require in a design that has been proved in service.

FB-691

For further details of Farrel-Birmingham mills, send for a copy of Bulletin 173. No cost or obligation.
FARREL-BIRMINGHAM COMPANY, INC.
ANSONIA, CONNECTICUT
Plants: Ansonia and Derby, Conn., Buffalo, N.Y.
Sales Offices: Ansonia, Buffalo, New York, Akron, Chicago, Los Angeles, Houston
Farrel-Birmingham

STOP... LOOK...and LIST 'EM!



...There may be several types of products that you need in this list of FLINTKOTE materials

Surely, there's at least *one* place in your plant or processes where materials listed on this page can serve you . . . and serve you *better*.

Maybe it's an improved kind of saturant you need. A new adhesive. Or a sizing . . . a protective coating . . . a mastic flooring emulsion . . . or products for waterproofing or dampproofing. The FLINTKOTE Line includes them all . . . and *more*. They're all *quality* products . . . all FLINTKOTE-made.

Maybe you're looking for a *brand new* product. One that improves your plant protection or your manufacturing processes. A *tailor-made* one—that no one else has been able to give you. Our research staff will be glad to help you develop it.

You can get a finished product . . . or one to use as a component in your own formulations.

We manufacture in volume . . . with plants from coast to coast.

So read the list at the right—make *your own* list—and send it to us for complete information, specifications and prices. No obligation, of course—and you'll be mighty glad to have FLINTKOTE as another reliable source of supply.

THE FLINTKOTE COMPANY
Industrial Products Division
30 Rockefeller Plaza, New York 20, N. Y.

Atlanta • Boston • Chicago Heights • Detroit
Los Angeles • New Orleans • Washington
The Flintkote Co. of Canada, Ltd., 30th St., Long Branch, Toronto, Canada

ADHESIVES

- Asphalt Emulsions—cold applied
- Asphalt and Rubber Compounds
- Solvent Rubber Cements
- Synthetic Rubber and Resin Compounds
- Rubber and Resin Water Dispersions
- Asphalt Tile Cements

SATURANTS and SIZINGS

- Asphalt Products for Waterproofing paper, cloth, building materials
- Rubber Compounds for Carpet Backing and impregnating
- Binders for various compositions
- Tire Cord Dipping Solutions

COATINGS

- Products for Waterproofing and Dampproofing
- Protection for Thermal Insulation
- Corrosion-Resistant Protection
- Sound-Deadening—Spray-on Anti-Slip Floor Coating
- Joint and Crack Sealers—hot and cold applied
- Asphalt Base Aluminum Paint

FLINTKOTE
Products for Industry

PIONEERS IN *Acrylics*

In the vast new expansion of our air might, SWEDLOW specialization in acrylic enclosu
is playing an increasingly important part.

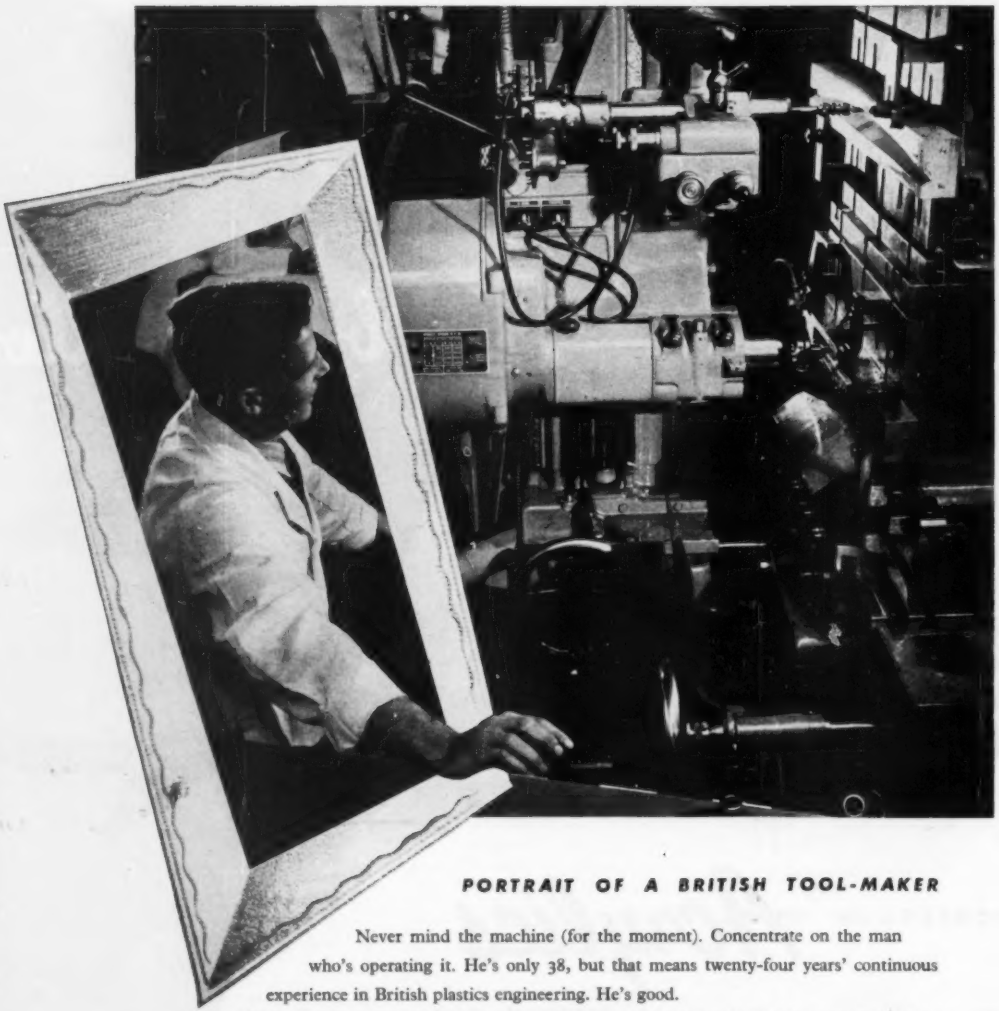
10 years of pioneering in the precision engineering and production of astrodomes, canc
windows—with perfection in optical properties, regardless of size—has been an important
bringing to SWEDLOW the contracts of the great names in the aircraft industry.

Two plants in California and the centrally located plant in Ohio are now at the service of the ai
industry, with duplicated facilities and tooling as a precautionary measure for any emergency.

Swedlow PLASTICS CO.

● *We shall be glad to assign a staff engineer to work with you in solving problems in plastics connected with new developments in the industry.*

SWEDLON—anothe
LOW specialty—is cur
being supplied, as Fuel
Backing and Cargo-liner,
the leading aircraft manufa
turers of the U.S. and Canada.



PORTRAIT OF A BRITISH TOOL-MAKER

Never mind the machine (for the moment). Concentrate on the man who's operating it. He's only 38, but that means twenty-four years' continuous experience in British plastics engineering. He's good.

Like him to work for *you?* The machine he's handling (a Keller die-sinking machine) is just one item in a tool-shop as modern in equipment and organisation as any in the Western World. The company he works for ✻ banks its reputation on *accuracy and know-how.* It makes tools for every kind of plastics molding, for export to many countries throughout the world.

A good steel mold is a key asset in your business, standing for an important sum of money. So long as that money's well spent, a short sea journey is neither here nor there.

✻ B.I.P. TOOLS LIMITED

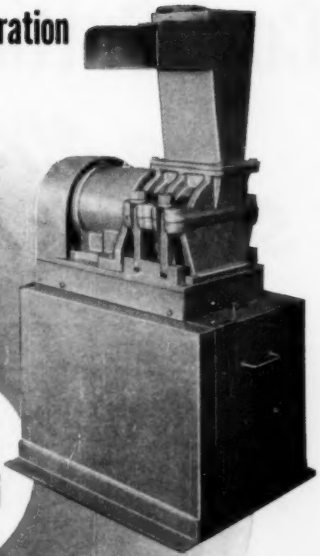
TYBURN ROAD, ERDINGTON, BIRMINGHAM 24, ENGLAND

Cables: PLASMOULD BIRMINGHAM ENGLAND

B·I·P GROUP

There's a model designed for *your* method of operation

HIGHLY EFFICIENT
EASY TO CLEAN
RUGGED



Cumberland PLASTICS GRANULATING MACHINES

DIRECT COUPLED
(Model 1/2 Illustrated)
FOR CENTRAL GRINDING

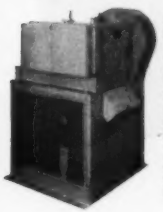
Used primarily when scrap material is transported to a central area for the granulating operation. Capacity is large in proportion to size of machine. Available in Models 0, 1/2, 1-1/2, and 18.

V-BELT DRIVEN
(Model 1/2 Illustrated)
FOR USE BESIDE EACH INJECTION MOLDING MACHINE

Saves handling costs. Prevents contamination of material. Occupies less floor space. Material container is built-in. Available in Models 0 and 1/2 only.

For complete information, request Bulletin 250.

CUMBERLAND



ROTARY CHOPPING MACHINE

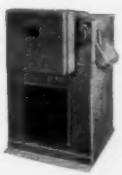
Heavy duty, rugged machine. Used for cutting thick vinylite slabs from two roll mills. Also used as large capacity pelletizer. Other applications are described in Bulletin 400.

CUMBERLAND

GRANULATING MACHINE MODEL 18

Large capacity. Double hung construction. Easy to inspect, dismantle, and adjust. Further details are in Bulletin 250.

CUMBERLAND



PELLETIZING MACHINE

Smaller, companion model to Rotary Chopper. Designed specifically for use with continuous extruders. Request Bulletin 500.

California Representative:
WEST COAST PLASTICS DISTRIBUTORS, INC.
2325 Jesse Street, Los Angeles 23, Cal.

Cost-Cutting Answer to hand-labeling

...a MYSTIK Self-Stik label

MYSTIK Labels are solving hand-labeling problems for every kind of product. Use them to sell, identify, instruct . . . for permanent or temporary labeling.

MYSTIK Labels, made of rubber-saturated paper base, are flexible and tough, are resistant to stain, moisture, scuffing. The rubber adhesive integrates with the rubber-saturated base—for sure adhesion to hard-to-label surfaces. No peeling, curling, cracking or delamination. Yet they remove, if desired, without stain.

MYSTIK Labels can be beautifully printed in colors, die cut to all shapes and sizes, embossed, varnished, acetate laminated. Write for free samples and full information now. Chicago Show Printing Co., 2669 N. Kildare, Chicago; 400 Madison Ave., New York; Offices in principal cities.

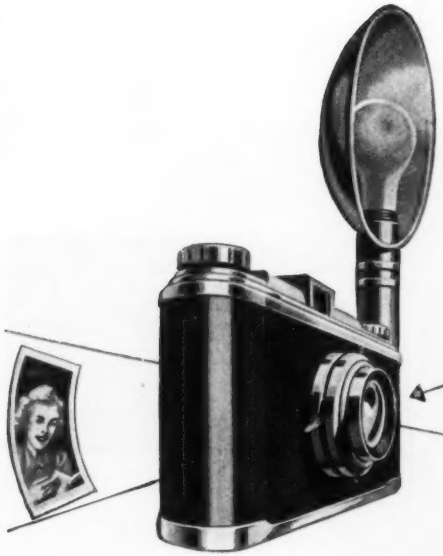
CHICAGO SHOW
PRINTING COMPANY
CHICAGO • NEW YORK

Identify and price parts with MYSTIK Labels.

Aluminum foil label for furniture product.

Trade mark label for vacuum ware.

Informative label for plastic table top.



for molding
or
calendering

Dowtherm

for efficiency and economy in process heating

DOWTHERM,® the heat transfer medium for high temperatures, has economically increased efficiency and improved quality in many cases.

DOWTHERM has made definite contributions to the plastics industry. Its ease of control and application assists in the mass production of nylon and phenolic and alkyd resins.

DOWTHERM speeds the heating cycle and reduces labor costs. An outstanding characteristic is the accurate control it affords in obtaining temperatures between 300 and 750° F. at low pressures.

Are *you* fully acquainted with DOWTHERM'S higher operating efficiency? For more information write Dept. DO-5A.

THE DOW CHEMICAL COMPANY • MIDLAND, MICHIGAN

SPEEDS HEATING • IMPROVES PRODUCTION

DOWTHERM

METALMASTERS, INC.
Serves the
PLASTIC INDUSTRY

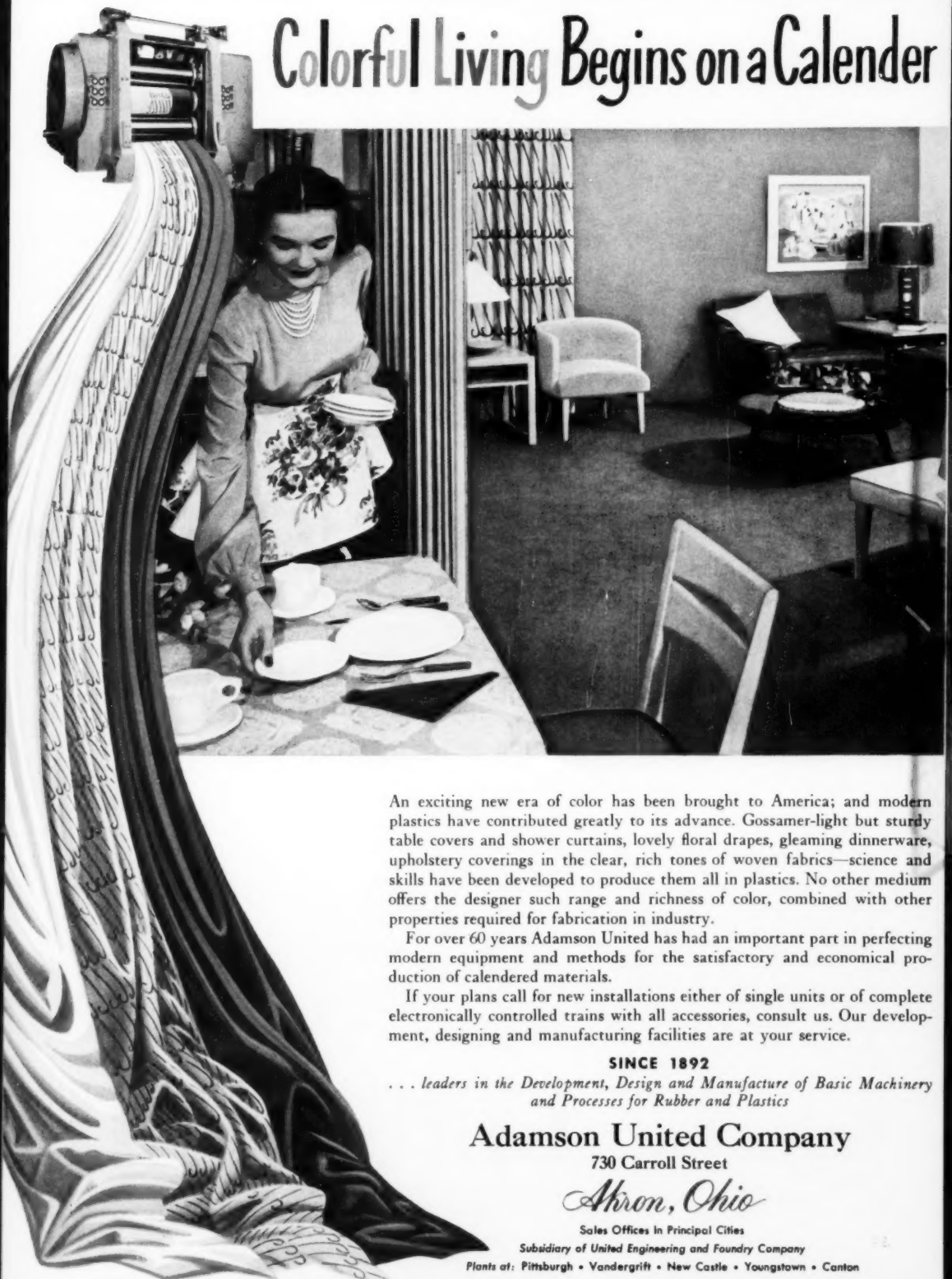
Behind the trademark stands a highly experienced personnel, with modern equipment and facilities to satisfy the most exacting specifications.

Metalmasters, Inc., **is serving the plastic industry specializing in HOBS and HOBBED CAVITIES for plastic molds, where quality and service are stressed consistently.**

Metalmasters **is proud to have the trademark on its products, which include zinc and aluminum diecastings.**

5292 NORTHWEST HIGHWAY • CHICAGO 30, ILLINOIS

Colorful Living Begins on a Calender



An exciting new era of color has been brought to America; and modern plastics have contributed greatly to its advance. Gossamer-light but sturdy table covers and shower curtains, lovely floral drapes, gleaming dinnerware, upholstery coverings in the clear, rich tones of woven fabrics—science and skills have been developed to produce them all in plastics. No other medium offers the designer such range and richness of color, combined with other properties required for fabrication in industry.

For over 60 years Adamson United has had an important part in perfecting modern equipment and methods for the satisfactory and economical production of calendered materials.

If your plans call for new installations either of single units or of complete electronically controlled trains with all accessories, consult us. Our development, designing and manufacturing facilities are at your service.

SINCE 1892

. . . leaders in the Development, Design and Manufacture of Basic Machinery and Processes for Rubber and Plastics

Adamson United Company

730 Carroll Street

Akron, Ohio

Sales Offices In Principal Cities

Subsidiary of United Engineering and Foundry Company

***Plants at:* Pittsburgh • Vandergrift • New Castle • Youngstown • Canton**

PRODUCTION RATE

100" or more per minute

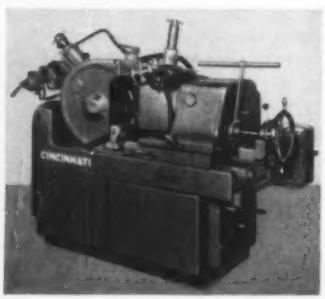
centerless grinding plastic tubes and rods on a cincinnati filmatic

Grinding plastic tubes on a CINCINNATI FILMATIC No. 2 Centerless Grinder, at a production rate of well over 100" per minute. Stock removal .050" to .075".

Because of its speed and accuracy, the centerless method is ideal for rapid, precision grinding operations on plastic and ceramic parts. Electrical insulators, glass bottle stoppers, pump packing rings, fountain pen parts, plastic tubes and rods, and others are being ground at extremely rapid rates of production on CINCINNATI FILMATIC Centerless Grinders. The illustration shows how plastic tubes and rods are ground at a rate of 100" per minute. ¶ Many features give CINCINNATI FILMATIC Centerless Grinders a low-cost rating for work of this type. FILMATIC grinding wheel spindle bearings run for years without adjustment or maintenance; lubrication is automatic; electrical control equipment is built-in. And to top it off, Cincinnati Application Engineers can give you the benefit of 25 years' experience in centerless work. They'll be glad to help you with your high priority production problems.

CINCINNATI GRINDERS INCORPORATED
CINCINNATI 9, OHIO

P.S.—If you're not familiar with the centerless method of grinding, write for booklet, "Principles of Centerless Grinding," No. G-503-2.



CINCINNATI FILMATIC No. 2 Centerless Grinding Machine. Catalog No. G-591-1 contains complete specifications. For a brief description of the centerless machines, look in Sweet's Catalog File for Mechanical Industries.

CINCINNATI

CENTERTYPE GRINDING MACHINES • CENTERLESS GRINDING MACHINES
CENTERLESS LAPPING MACHINES • MICRO-CENTRIC GRINDING MACHINES

THE

VERSATILE CHEMICAL that has PLASTICITY PLUS...

DP 520

DP 520 is more than a plasticizer! It is an extremely versatile chemical with many unusual properties. It gives products flexibility, clearness, toughness, permanence . . . and exceptional stability against humidity changes.

For example, ZEIN (shown here) becomes extremely plastic when DP 520 is added.

DP 520 has a low susceptibility to heat or cold. It is compatible with natural or synthetic resins . . . may be used with casein, zein, soybean protein, and synthetic rubber compounds.

DP 520 is ideal for use in making coatings, adhesives, impregnants, inks and other protein-base products. Write for further information and technical details.

SPECIFICATIONS

Specific Gravity	1.110 (25/4)
Refractive Index	1.480 (23°C.)
Viscosity (Saybolt Univ.)	50 min. (20°C.)
Flash Point	145°C.
Smoke Point	90°C.
Boiling Range	None below 170°C.
Evaporation Rate	9.0×10^{-5} gms./cm²/hr. (100°C.)
Soluble in	Acetic acid, acetone, benzene, carbon tetrachloride, cellosolve, chloroform, dioxane, ethanol, ethyl acetate, ethylene dichloride, ethylether, gasoline, petroleum ether, toluene.
Insoluble in	Water
Compatible with	Casein, zein, soybean protein, nitrocellulose, polystyrene, ethylcellulose, cumar, polyvinyl acetate.

TECHNICAL PRODUCTS DIVISION

E. F. DREW & CO., Inc.

15 EAST 26th STREET, NEW YORK 10, N.Y.

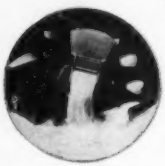
DREW PRODUCTS

CHICAGO **BOSTON** **PHILADELPHIA**

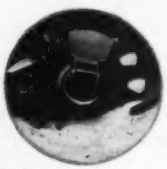
STURTEVANT DUSTLESS BLENDERS

Thoroughly Blend Substances into an Inseparable Mass

The 4-Way Mixing Action of the Sturtevant Dustless Blenders thoroughly mixes two or more substances into an inseparable whole . . . every part of which is the same analysis. Single receiving and discharging opening insures tight sealing during mixing process. "Open-door" accessibility permits thorough cleaning. The fast, accurate mixing operation increases output . . . cuts mixing costs. Available in many sizes with mixing capacities from ¼ ton to 75 tons per hour. Write for information and catalog.



Receiving — The ingredients to be mixed enter the mixing chamber of drums through a chute. Note scoops which carry up and dump the ingredients as drum rotates assuring a more uniform mix.



Discharging — Throwing a lever closes the inlet and mixer is in discharging position. The completely mixed materials drop off the lifting scoops and discharge through chute without segregation of ingredients.

The Sturtevant Mill Company

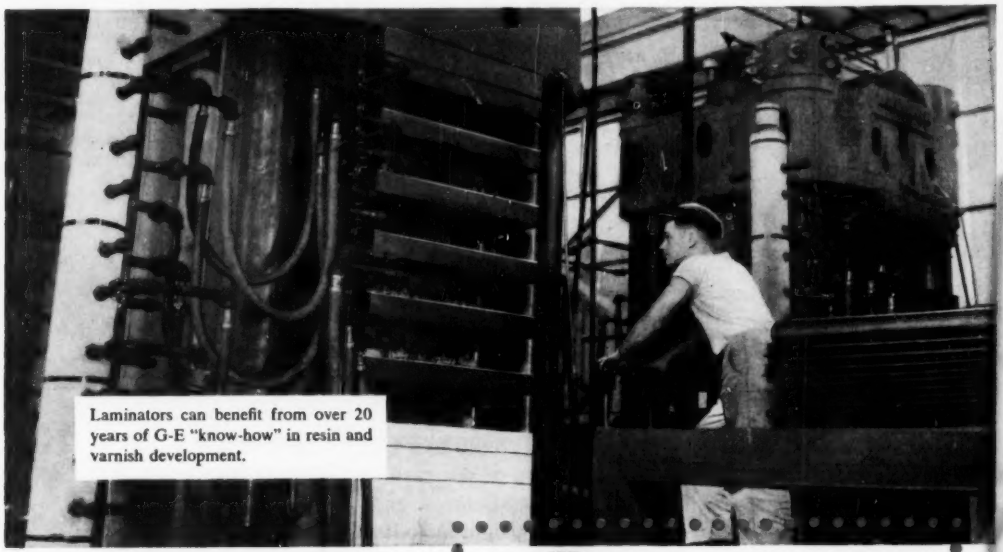
110 Clayton Street, Boston 22, Massachusetts

Designers and Manufacturers of: CRUSHERS • GRINDERS • SEPARATORS • CONVEYORS • MECHANICAL DENS and EXCAVATORS • ELEVATORS • MIXERS

Plastics NEWS

MOLDING COMPOUNDS
LAMINATING & INDUSTRIAL RESINS

ALKYDS • PHENOLICS • POLYESTERS • RUBBER-PHENOLICS • SILICONES



Laminators can benefit from over 20 years of G-E "know-how" in resin and varnish development.

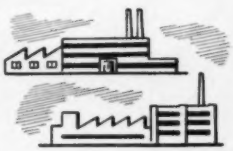
G.E. offers complete line of phenolic laminating resins and varnishes

General Electric quality-controlled resins are now available for industrial, decorative, treated stock and refrigerator "inner door" applications. Laminators can benefit from G.E.'s technical service group which is ready to assist you with your present manufacturing problems and in the development of new products.

To help you broaden markets for laminated products, G-E chemists and engineers are constantly working with alkyd, phenolic, polyester, rubber-phenolic, silicone and other thermosetting resins. *For full information, just write to Section L-1, Chemical Division, General Electric Company, Pittsfield, Massachusetts.*

Save time and reduce costs with versatile G-E 12301 varnish—G-E 12301 general-purpose phenolic varnish is so versatile that different thicknesses and types of laminates may be pressed simultaneously without necessity for close temperature control. G-E 12301 is suitable for use in laminates which meet NEMA and Government specifications.

Two Plants for quick service—General Electric operates two resin and varnish plants strategically located to provide prompt delivery to laminators in most sections of the United States. These plants are located in Coshocton, Ohio, and Pittsfield, Massachusetts.



You can put your confidence in

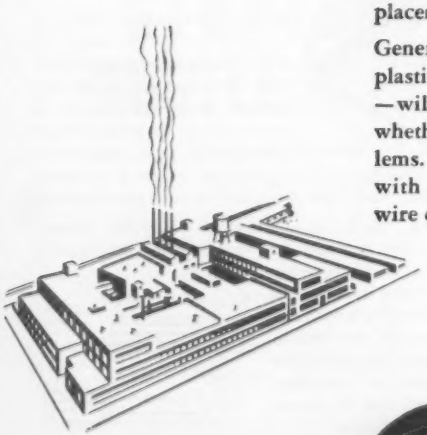
GENERAL ELECTRIC

Could molded plastics solve your CMP problems TODAY?

Many leading American Manufacturers have found and are turning to molded plastics as the ideal answer to the material shortages and production curtailments of recent months.

Users of die castings, stamped shapes, instrument housings, gears, indicator dials, handles and various miscellaneous parts have discovered in molded plastics an efficient economical replacement for materials now in short supply.

General Industries—one of America's leading plastics molders for more than thirty-five years—will welcome the opportunity to determine whether molded plastics can *solve* your problems. Absolutely no obligation for consultation with our competent engineering staff. Write, wire or phone *today!*



THE GENERAL INDUSTRIES CO. **DEPARTMENT R · ELYRIA, OHIO**

We're Particular about our PLASTICIZER "Prescriptions" too!

As a matter of fact, we probably go the old pharmacists *one better* when it comes to being exacting about making Pittsburgh PX Plasticizers. For, as a basic, integrated producer of coal chemicals—many of which are used by America's great plastics and rubber industries—we have the advantage of controlling the *quality* and *uniformity* of our plasticizers from coal to finished product . . . an advantage that assures *you* greater economy and ease of use in your plastics formulations.

When you think of dependable plasticizers, think of Pittsburgh PX Plasticizers —one member of a growing family of basic chemical products which serve the nation's industry and agriculture.

OFFICES:

New York • Chicago • St. Louis

Tulsa • Houston

Los Angeles • San Francisco

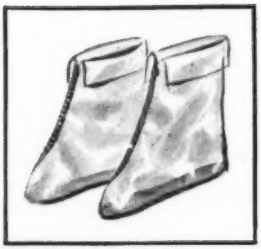
PLASTICIZER DIVISION

PITTSBURGH COKE & CHEMICAL CO.

Grant Building • Pittsburgh 19, Pa.

WAD 8762

Plastic Success Story!



THE "WELD" DRESSED GIRL
PUTS HER BEST FOOT FORWARD
IN HER NEW PLASTIC BOOTS

ELECTRONICALLY WELDED ON THE

Thermatron

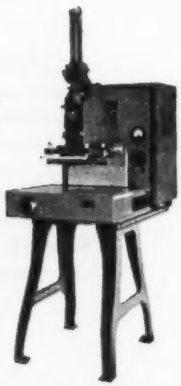
HIGH FREQUENCY SEALING AND HEATING EQUIPMENT

Here's another example of how this modern electronic heat sealing method inspires new plastic products and keeps production costs down tool Prepac, Inc., and National Plastikwear, both of New York, about to style their smart new plastic boots, consulted with our engineers and then O.K.'d installation of **Thermatron** high frequency generators and presses. They're doing the job right!

Prepac's Rainbeaus and National's Rainettes are made of sturdy vinyl, and the seams as well as the new plastic zippers are *welded* on the **Thermatron,** not stitched. The result? Completely waterproof boots that always hold their trim shape . . . The narrow, hardly visible seams are stronger than the material itself.

Electronic welding with efficient **Thermatron** equipment means faster, better, more economical manufacture of hundreds of diversified plastic products. Reduces rejects . . . Requires no special skills in the operation. It's a "natural" for most fabricators of vinyl.

Look into **Thermatron** today. Our engineers will be glad to make recommendations regarding your operations without obligation . . . And please write us for descriptive folder No. 61.



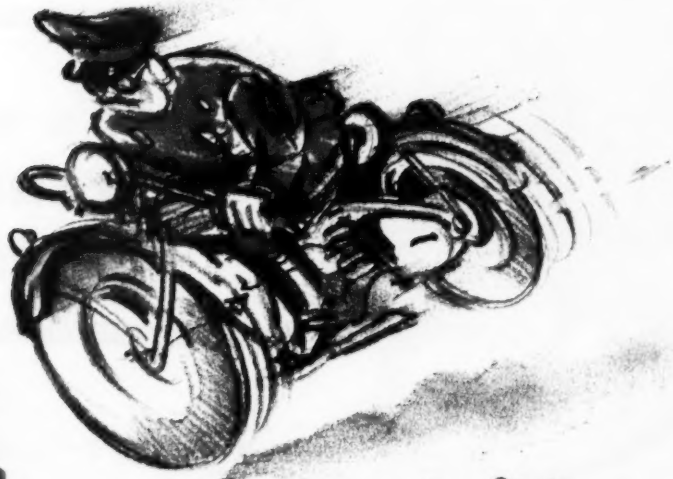
Standard Thermatron models from ¼ KW to 6 KW weld vinyl from .002" to .080", serving most requirements—or we can build to special application. Equipment also available for sealing cellulose acetate, and for electronic gluing of furniture and other wood products.

Thermatron
DIVISION

RADIO RECEPTOR COMPANY, INC.

Since 1922 in Radio and Electronics

SALES DEPT: 251 West 19th Street, New York 11, N. Y. • FACTORY: 84 North 9th Street, Brooklyn 11, N. Y.



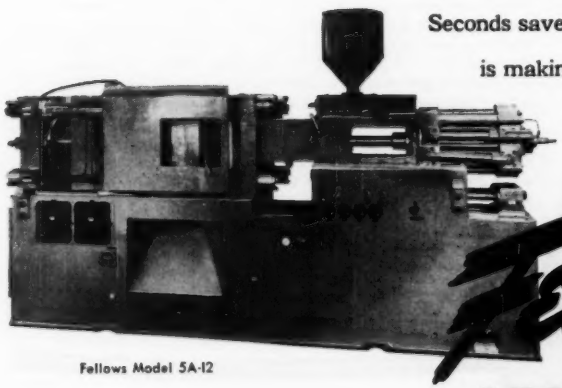
Watch the "Speed Cycle"!

It's unique... the Fellows introduction of a two-speed injection stroke. First, a long-travel, rapid advance, then a short, sharp 20,000 psi 'big push'.

Seconds saved! Fellows extra molding speed is making extra money for some smart operators.

Want to speed up, too?

We'll be glad to get in touch.



Fellows Model 5A-12

Fellows

LEOMINSTER

injection molding equipment

THE FELLOWS GEAR SHAPER CO., Plastics Machine Div., Head Office & Export Dept., Springfield, Vt. Branch Offices: 616 Fisher Bldg., Detroit 2, 5835 West North Avenue, Chicago 39 • 2206 Empire State Bldg., New York 1 • New England Distributor: Leominster Tool Co., Leominster, Mass.

Here's where durability counts...

—and Emery Plastolein Plasticizers give your plastics outstanding durability and wear-resistance

A small army of ever-active destructive forces works constantly to shorten the life of plastic garden hose the moment it goes into use. The scorching rays of the sun . . . the cutting abrasion of dirt . . . the drying effect of heat . . . the constant flexing of normal use . . . the punishing blasts of winter . . . the continual extraction by water—all contribute to gradual deterioration. In just such applications, Emery Plastolein Plasticizers prove their superiority in so many ways. They give you extremely low volatility, outstanding low-temperature flex, excellent heat and light stability, high resistance to hot and cold water and oil extraction. Wherever durability counts . . . be sure to specify Plastolein Plasticizers which offer outstanding resistance to the normal ravages of time and use.

Be certain your plastics remain plastic! **Specify** EMERY PLASTOLEIN PLASTICIZERS *every time!*

Emery *Plastolein Plasticizers*

EMERY INDUSTRIES, INC.
Carew Tower, Cincinnati 2, Ohio

Branch Offices:
3002 Woolworth Bldg., New York 7, New York
401 N. Broad St., Philadelphia 8, Pennsylvania
187 Perry St., Lowell, Massachusetts
221 N. LaSalle St., Chicago 1, Illinois
420 Market St., San Francisco 11, California
Export: 5035 RCA Bldg., New York 20, New York
Warehouse stocks also in St. Louis, Buffalo and Baltimore

A SPECIAL SERVICE TO MODERN PLASTICS READERS, REPORTING AND INTERPRETING THE LATEST NEWS AND DEVELOPMENTS FROM WASHINGTON AND ELSEWHERE AS THEY AFFECT THE PLASTICS INDUSTRY AND THE MOBILIZATION PROGRAM

Modern Plastics BULLETIN

July 16, 1951

What Could CMP Mean to Plastics?

Any answer to the above question would still be in the realm of speculation. For weeks and weeks the writer has been raising this point with man after man in the chemicals industry and with government officials. If there is any definite opinion as to just what will happen, we have failed to uncover it. Even government officials will give nothing but hazy theories on what may or may not happen to chemicals and plastics under a partial or all-out Controlled Materials Plan.

The worst thing that could happen, according to most members of the chemicals industry, would be an attempt to control chemical distribution in the same manner that steel, copper, and aluminum are controlled under CMP. By now everyone knows that under this plan the Government determines how much of the various metals is needed for 100,000 tanks or 50,000 planes or whatever else is scheduled. After the military needs are provided for, metal for essential civilian items is ticketed for distribution. This thing could be extended even to the point where the amount of copper to be used in ash tray clips is designated by Government decree. Chemical people are fearful that if the same type of control were applied to their products there would be complete confusion and chaos. They don't think anyone is smart enough to determine exactly how many pounds of sulfur or benzol or most any chemical would be needed for a given number of tanks, planes, or any other military items. They point out that the Chemical Div.'s allocation system provided practically every pound of chemicals that was needed for military purposes in World War II, and they see no reason for changing that method, which has already been set up under order M-45. But there are still a few planners in Government who won't give up the idea of a CMP for chemicals, and they will bear watching.

But regardless of whether or not a direct CMP type of control over chemicals should be instituted some time in the future (it would be physically impossible to do it soon), several indirect effects of the CMP metals control are already beginning to show up on the chemicals front.

Indirect Effects of CMP

CMP can have either a bad or good effect upon the construction of new chemical plants which are so sorely needed at present. If new plants now under construction or planned for immediate erection are rated as essential, CMP administrators will channel sufficient construction steel to them so that there will be no delay in building operations. Styrene, benzene, melamine, chlorine, and phthalic anhydride, are only a few of the many chemicals related to plastics that are involved in this new facilities program. The answer as to whether or not CMP will be helpful won't be known until the fourth quarter, when the decisions will be made on the allocation of structural steel, copper, etc., for hurrying along these new plants. In the meantime, chemical companies will have to continue to rely on priorities and directives to obtain construction materials and equipment, and that system has not been very fruitful insofar as speeding up construction is concerned.

A CMP Order for Wire Affects Plastics

Another effect of CMP in an entirely different facet is the tendency to make a CMP order for metals a mandatory demand for whatever is needed to produce a finished product by issuing a DOPM. For example, take that ash tray again. If a firm can obtain enough copper to make the clips on an ash tray it would theoretically be entitled to the phenolic needed for the ash tray itself. The fireworks on this problem are just beginning to sizzle. Thus, several wire coaters

who obtained copper under CMP have attempted to obtain polyethylene and vinyl for insulation on the theory that a CMP order for the metal used in the wire entitled them also to the plastics which insulate it. But since polyethylene is under allocation by Order M-45 and the wire end product is not military or deemed essential, the requests for direct allocation of polyethylene were refused. Whether or not the customer gets it depends upon whether or not the polyethylene supplier could furnish it out of the material turned back to him to distribute as he sees fit after all military and essential requests were filled. Vinyl is not under allocation, and theoretically, at least, a supplier must consider this DOPM the same as a straight DO order.

All or Nothing?

Another firm tried another wrinkle. It uses chemicals A, B, and C to manufacture a material that is used in the production of product D. In normal times only chemical A is used for this process, but A is short so B and C are used to help out. Now that the company has metal by grace of a CMP order to manufacture product D, it insists that the CMP order entitles it to enough of chemical A to do the job alone. If this situation is carried to its limit, the chemical supply situation will become a most awful scramble. In war time, especially, the chemical industry has taught its customers to use replacement materials to fill out where shortages occur. If customers are going to be permitted to demand a certain chemical regardless of its scarcity just because they have a CMP order, the situation in certain critical chemicals will become even more critical. Certainly there is no guarantee that there is enough benzol, sulfur, phenol, etc., to match the CMP demand for steel, copper, and aluminum, unless these users are willing to substitute other chemicals in certain places where they are adequate even if not as satisfactory.

Metal inserts used by the plastics industry pose another huge problem. No one as yet seems to know just how to work out in advance the amount of metal that will be needed for inclusion as inserts in plastic molded items for military and essential goods. Would anyone like that particular job?

Still another angle on the subject is how the CMP idea infiltrates into other orders. An example is M-60 for grinding wheels; M-60 is a little CMP in itself. This order permits manufacturers of grinding wheels to obtain 105% of the metal they used in their base period. They may then issue DO orders to obtain the necessary phenolic material to make up their product. There was also a fear at one time that the order granting operating supplies to low voltage electrical equipment manufacturers would result in an inordinate demand of phenolics for parts, but no one as yet has been able to figure out the impact of this order on the phenolic supply line.

Phenolics Under Limited Control

An alert reader could have guessed when he read this column last month that some type of control over phenolics was in the wind. Whenever the DO order demand for chemicals nears 40% of total production, as reported here last month, there is always a likelihood that some sort of control is just around the corner. Phenolics were placed under M-32 which is an interim order between the DO priority system and complete allocation such as would be invoked under M-45, the order which now controls polyethylene, Teflon, nylon, and resorcinol. M-32 is the same order under which ethyl cellulose was placed months ago. This does not necessarily mean that phenolic resins will eventually come under complete allocation. That eventuality depends upon what happens to the phenol and formaldehyde supply lines and upon the defense production picture. There had been confident expectation that the new Bakelite phenol plant mentioned last month would eliminate the need for phenolics control; but its slowness in coming into production, due to the trouble in obtaining equipment, plus the constant increase in DO business and the threat of a demand for phenolics to serve CMP business, forced the issue.

Dividing up DO Business in Phenolics

M-32 is the order whereby no producer is required to fulfill more than a certain percentage of all DO orders that are issued. The purpose is to divide up the DO business between all producers so that it will not be concentrated among only a few. The molders who have been getting material from suppliers without much DO business may now have to scramble for DO orders in order to get enough material to keep operating at capacity, for those suppliers will now have to channel more material to DO business.

The order specifies that phenolic molding powder producers will *not* have to accept DO orders that require more than 35% of their production. Liquid resin DO orders—and this includes nearly every category of phenolic resin except molding powder—must be accepted by the producer at up to 45% of his capacity.

Any person who is unable to place a rated order for phenolics because of the effect of this order should apply to the Thermosetting Unit, Plastics Section, Chemicals Div., N.P.A., Tempo Building T, Washington, D. C. N.P.A. will arrange to assist him in locating sources of supply.

The order also specifies that requisitions must be in the hands of the supplier 15 days before first day of the month of delivery. The purpose of this specification is to prevent last-minute orders from upsetting schedules.

The study of phenol, primary factor in the phenolic scarcity, goes on apace. There are various sets of figures and statistics on production and use of phenol in existence, but no two of them ever give the same result. The conversion factor in particular is subject to a variation in estimates because different companies use different formulas. One critic also claims that in this column last month we did not allow for enough cresol in laminates, but a check with NPA officials leads us to believe that cresol is being less widely used than often believed: it simply isn't available in the same quantities as during the war years.

The Future for Phenol

Here are some interesting figures on the phenol situation:

Total phenol produced in 1950	310,391,000 lb.
Total used in 1950	342,000,000 lb.
Amount over production came from carryover	
Phenol used in phenolic resins, 1950	
Between 210,000,000 and	220,000,000 lb.
Phenol requirements for plastics, 1951	260,000,000 lb.
Total phenol requirements, 1951	375,000,000 lb.
Amount of phenol available in 1951, based on present rate of production	350,000,000 lb.
To this amount may be added new production later this year	15,000,000 lb.
Total phenol used in 1950 was divided percentage-wise as follows:	
Phenolic resins	62
Chemical uses	14.5
Petroleum refining	7
Pharmaceutical	5.5
Disinfectants and insecticides	3
Misc., including ink, exports, etc.	8
Requirements of phenol for plastics in 1952	300,000,000 lb.
Requirements of phenol for plastics in 1955	
Over	400,000,000 lb.
Total estimated requirements in 1952	425,000,000 lb.
Total estimated requirements in 1955	Over 550,000,000 lb.

These estimates are based on a defense economy, but even a normal growth estimate would place the 1955 figure at over 425 million lb. of phenol. The percentage required for plastics is expected to increase due to a continually broadened base that includes such things as foundry sand cores and wood waste and mineral insulation binders, to say nothing of the constantly increasing uses for molding powders. The other applications for phenol are not expected to show such a rapid percentage of gain. Petroleum refining will require 38 million lb. in 1951 in comparison to 20 million lb. in 1949, but the increase is due more to greater petroleum production than it is to a broadening base. Yet one can't be sure, for some interesting experiments have been conducted in the matter of using phenol to make oil go farther.

Another matter that is of extreme importance for this year and next is the scarcity of sulfur, which is used in one of the processes for producing phenol. The above production figure for 1951 could be cut to pieces if the sulfur situation gets any worse.

The Government is making surveys on the amount of phenol actually going into all these different things, and a more accurate figure may be available at some later date.

Directive Versus Rating

Our attention has been called to persistent efforts on the part of some individuals to obtain material by asking the Government to issue directives. A directive is more or less a mandatory order by the Government to channel certain materials to particular jobs in case of emergency. The emergency of course must be real and vital, and must relate to some problem that can't be handled by orders already set up. But whoever asks for a directive must remember that it is non-extendable; that it, when it is applied against a raw material supplier or fabricator it cannot be re-extended to enable that supplier to obtain the basic raw materials with which to produce the goods. On the other hand, a DO or other rating has infinite extendability against the basic raw materials. Thus, a raw material producer could use a rating to help him get benzol, methanol, etc., but a directive strips his plant of the finished material asked for without providing any means for replacing the chemicals used in making up the order. A directive for a material like phenolics could create a lot of headaches because there are so many different things required before a pound of the material can be produced.

Possible Phenolic Meeting

Under the circumstances now current in the phenolic resin industry it is possible that a meeting of industry representatives may be called some time in the future to discuss the problems involved. It has therefore been suggested that members of the industry write to NPA concerning the subjects they think should be discussed. Such subjects as the supply of phenol, steel, nickel, drums, and anything else in reference to supply lines might be part of the proposed agenda. The individual to write to is Thomas J. Martin, chief, Thermosetting Unit, Plastics Section, Chemical Div., National Production Authority, Tempo Building T., Washington, D. C.

Polyethylene Allocation

Polyethylene allocation went along a little more smoothly during the second month, but the basic problem will remain for months to come: there just isn't enough to meet demands. Military demand was down from 50 to 44% of total production, but there is nothing permanent about that decline. Next month it may be up again. Essential civilian demand accounted for allocation of 35% of total production. This left the amount for producers to distribute as they saw fit at 21% of total production. The month before, this "free" material was only 16 percent. Thus distributors had more to distribute to other than government designated spots.

One reason for this change was that NPA officials removed the following categories from essential

civilian distribution: containers for agricultural products such as seeds, insecticides, etc.; agricultural farm pipe for water sysems; meat wrappers for other than frozen foods; chemical unit packs which means bottles, etc., as against drum liners. Two more of the original 12 essential civilian items will probably be put on the "free" list next month. There was at least one fly in the ointment, however; there was something like 400,000 lb. less to distribute because of manufacturing difficulties.

As mentioned previously, DOPM or CMP orders for polyethylene were turned back to the "free" list by NPA. These were chiefly for wire such as that used on extension cords, television lead-in wire, etc. NPA officials reasoned that the processors could use something else or get enough polyethylene to do the job from the producers' "free" list. DO 48s issued on authority of the electric utilities order for maintenance, repair, and operating purposes were also referred to the "free" list.

Cellulosics

There has not been much change in the acetate and butyrate situation for several months. Raw materials such as acetic acid and alcohol are scarce, but not impossible to get. Cotton linters are obtainable but at a high price, and there is not much more wood pulp yet available. Linters should drop in price this fall when the huge new cotton crop comes in. That crop will be the third or fourth largest in history; last year's crop was one of the smallest. There was a little more molding powder available last month than in previous months due to fortuitous manufacturing conditions, but it is too early to know whether or not it was picked up; some people say supply is now just about equal to demand. No increased production is expected in the near future, or until more raw material is available. There will probably be large procurement of cellulosics for electronics if a big war starts.

Acetate block sheet is almost 100% military where it is used for windows, cockpits, optical frames, etc. This is the type generally used for playing cards, sequins, ornaments, lamp shades, optical goods, etc. But the newer type of extruded sheet is by no means 100% military. This is the type used for boxes, toys, etc. Extruded acetate film is heavy in DOs and is largely used for electronics purposes by the Armed Forces.

A big, new, highly restricted use for ethyl cellulose film has popped up, and one or two others of less magnitude are on the horizon. This might be the final straw that would put ethyl cellulose under complete allocation, but big procurement for the new use is probably several months away. Publication in Scripps Howard papers of a critical item about the use of proximity fuses in Korea raised eyebrows in Washington. The e.c.-nosed proximity fuse had wide publicity as the most effective weapon—next to the atomic bomb—used in the last war. The article said Americans hadn't used it much in Korea; when they did try they didn't know how. Russians reportedly has used a small number successfully. This story might explain why procurement of e.c. for this purpose has been low even though it is known that other plastics are being experimented with for the same use.

Notes on Plastics for Armed Forces

The Armed Forces are particularly interested in more widespread development and use of foamed plastics. They have scores of places where a foamed plastic seems to be the ideal material. The use of isocyanate by the Air Force in radomes and in other void spaces has been publicized, but it is too costly and scarce for more mundane purposes. Navy and Army men are particularly interested in phenolic that can be foamed in place: it might be ideal for thermal insulation in hot spots; for filling up empty spaces in various types of equipment. Vinyl, styrene-acrylonitrile copolymer, and phenolic foams are being considered for rafts: a 5- by 9-ft. raft molded in one piece from foam and without a skin may be a possibility. A polystyrene foamed core for a raft has also been experimented with. Life saving suits with foamed inserts are another possibility.

The Navy Yard at Puget Sound is planning a big show soon to display its new 32-ft. polyester-glass landing boat produced by Navy technicians.

A development contract for two 400-gal. polyester glass water tanks to be mounted on a truck chassis has been awarded to Winner Co. These prototype tanks will weigh only four-fifths as much as a metal tank—may even get down to half the weight of metal. Biggest worry at the moment is that the tanks will vary in construction and performance due to hand lay-up. Tests have already been made to assure the Army that there will be no effect on taste of water. Tanks will be tested in all parts of the world for one year. The tank in Alaska will contain a space heater to prevent freezing. Army hopes to prove there will be savings because of maintenance cost; a metal tank in Okinawa lasts only a month. There is talk of a similar program for amphibious trucks (ducks) in the near future.

Army is experimentally coating small arms stocks made of metal with plastisol. The vinyl will supposedly prevent heat of the metal from affecting the soldier who uses the gun.

Contracts for 16,000 polyester glass sheds have been let by the Army.

The Navy is particularly interested in plastic pipe —has used some polyester glass in spots where heat requirements are not critical, and it held up well in comparison to aluminum and copper pipe. But the Navy wants flame retardance, thinks rigid vinyl will do the job. It can be worked, welded, and fabricated easily, and appurtenances can be easily welded to it.

MODERN PLASTICS
VOLUME 28 AUGUST 1951 NUMBER 12

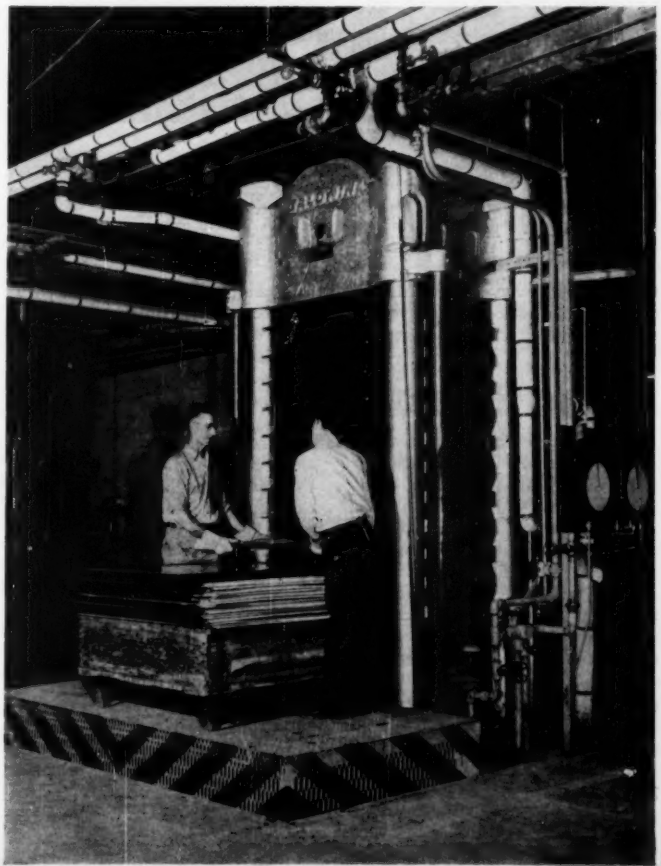
Laminates Unlimited

New horizons are opening for industrial high pressure laminates. Continuing development work is being done by laminators and materials makers

WHEN speaking of high pressure laminates, little can be said about the beauty of industrial laminates; the decorative laminates steal the show from the beauty standpoint. There is, however, a wealth of engineering and production romance behind the multitude of achievements made possible by the many different types of industrial high pressure laminates. And the numbers and scope of these laminates are being continually increased through research and development work being done in the laboratories of the laminating materials manufacturers as well as of the laminators themselves.

This cooperative effort has led to such developments, by way of example, as: 1) an electrical insulation material which has a power factor at 60 cycles approximately ⅛ that of its predecessor, and which is sold in the same price range; 2) a panel board material of melamine and fibrous glass, made at a marked reduction in cost and with superior properties; 3) a laminate suitable for high temperature applications—up to 480° F. under continuous service and even high temperatures for intermittent service—produced by combining silicone resin and fibrous glass; 4) the successful bonding of metal foils to many grades of laminates, resulting in ever-widening use of printed circuits.

From a military standpoint, there is no doubt that the percentage of the industrial laminate output going into products for the Armed Forces is higher than that of either compression or injection molding. The laminate percentage is topped by extrusion, only because of the terrifically high procurement of vinyl, nylon, and polyethylene-coated wire used by the Armed Forces. The fact that so much laminate is being made into products for the Armed Forces has an appreciable effect on the applications that can be described in this article. Many are so secret that

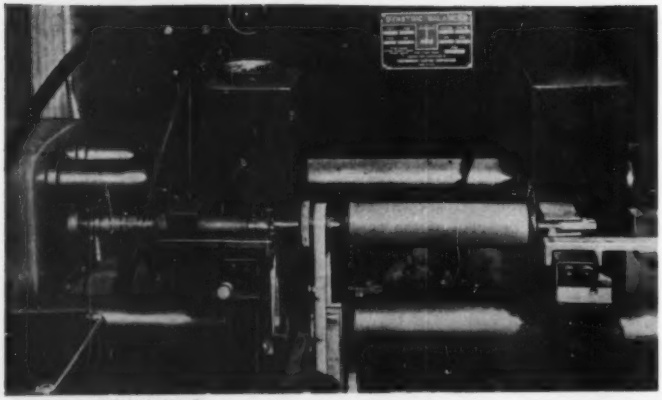


Courtesy National Vulcanized Fibre Co.

Multi-platen laminating press is used to bond copper foil to laminate sheet for application in printed circuits

Courtesy Synthane Corp.

Pirn for nylon yarn includes wrapped-tubing barrel, molded-macerated cone and top flange, laminated bottom flange



Photos courtesy Gisholt Machine Co.

Top: Variety of types of spools made of laminates which find many uses in the textile industry. Among other manufacturers of these bobbins, The Richardson Co. makes use of a balancing machine (shown in lower photo) to insure precision dynamic balancing of all rotating parts, permitting higher speeds, improved yarn, reduced maintenance costs

they cannot even be mentioned; others, while not completely secret, can be covered only in a general manner.

Resins and Fillers

Many fillers or reinforcements and several resins are being used by the high pressure laminators. Probably the most widely used filler is paper, which may be listed by types as: Kraft paper, alpha cellulose paper, and cotton fiber paper. Kraft paper is used in laminates intended for general mechanical applications. These are the general run-of-the-mill laminates, with fairly low moisture absorption and acceptable physical properties. Where both good mechanical and good electrical properties are required, an alpha cellulose paper is generally used. If still better mechanical strength is required, and at the same time equally good electrical properties are necessary, the choice is cotton fiber paper.

Next in importance to paper as a filler or reinforcement is cotton cloth. Fine and medium weaves are used where the laminate must have excellent machining properties, as when fine pipe threads must be cut, for example. A coarse weave filler produces a laminate with a higher strength, but machining properties suffer somewhat.

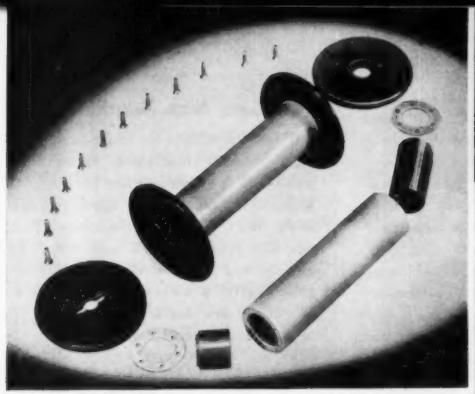
Generally speaking, cotton cloth is used where better strength is required than can be achieved with paper, although it must be remembered that the electrical properties of cloth reinforced laminates are not as good as when paper is used as a filler.

Asbestos is used as a filler, in the form of paper, cloth, or mat, where somewhat higher heat resistance is required than can be obtained with the three types of papers previously discussed. Asbestos cloth has a somewhat better heat resistance—on the order of approximately 50° F.—than asbestos paper. If higher physical properties are required than can be obtained with asbestos in the form of either paper or cloth, it is recommended that asbestos mat be used for the application.

When very high impact properties are required, fillers of either nylon or fibrous glass are used. Nylon reinforced laminates have very low water absorption and are also recommended for uses where a high resistance to fungus growth is nec-

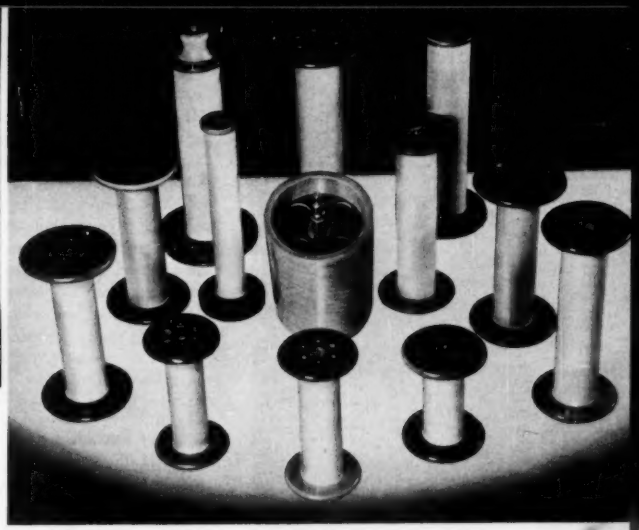
Laminates were chosen for five parts of rayon yarn cake expander because of smoothness, light weight, and strength

Courtesy National Vulcanized Fibre Co.



Courtesy Synthane Corp.

Nylon yarn pirn has paper base barrel, heads of random fiber cotton, bushings machined of paper base rod stock



Courtesy Synthane Corp.

Advantages of plastics for textile bobbins include good balance and moisture, chemical, and impact resistance

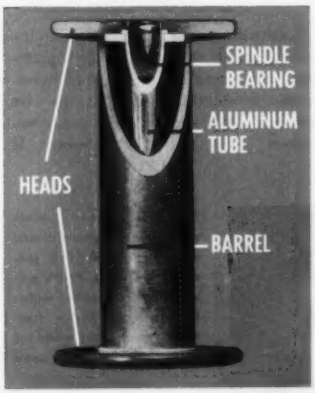
essary. Glass cloth or mat will yield laminates with equal or better physical properties as well as excellent electrical properties.

Laminating resins include many different formulations of phenolic, several grades of melamine and silicone, and, in minor quantities, a number of specialty resins. Generally speaking, the phenolics produce the least expensive grades of laminates and are at the lower end of the scale as far as resistance to high temperature is concerned. Next in line, both as to cost and temperature resistance, are laminates produced with melamine; on top is silicone.

The wide variety of laminates produced from these different fillers and resins is used in a broad range of industrial applications. The textile, electrical, and refrigeration industries consume the greatest tonnage of laminates. However, wide use is also being made of these materials in mechanical applications—gears, bearings, pulleys, etc.

Three different laminates are "tailored" for use in this assembled-unit bobbin

Courtesy The Formica Co.



In Textile Production

The textile industry is using such a great variety of laminated parts in such great quantities that at least one laminator, Synthane Corp., Oaks, Pa., has set up a separate division for their manufacture. Here, for example, bobbins are produced by the thousands in various sizes, shapes, and designs. These plastic laminate bobbins are in particular demand in the production of extremely fine synthetic yarns which require non-snagging, smoothly machined parts. The bobbins are resistant to moisture and chemical attack, can withstand the crushing force exerted by thousands of turns of yarn, and can be produced in perfect balance for high speed operation. They are replacing wooden or aluminum bobbins in many large mills.

The barrels of the bobbins produced by Synthane are usually made from a tube of paper-base phenolic laminate, and the heads are machined from phenolic laminate sheet having either cotton cloth or random fiber cotton filler. The heads are generally assembled with stainless steel Phillips head screws.

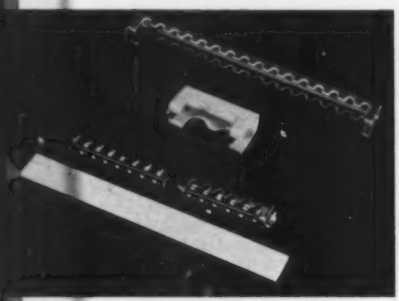
Another laminator who has made a detailed study of bobbins for the textile industry and is now producing them on a large scale is The Formica Co., Cincinnati, Ohio. One such bobbin, shown on this page, uses a different grade of laminate for each of three plastic components. The accurately machined heads are designed to have high impact strength, to resist flexing under enormous yarn pressures, and the material is stabilized to retain proper balance. The barrel is built to withstand heavy radial compressive forces and has a smooth surface finish. The spindle blade bearing bushing is made of a laminate with good wearing qualities which is also stabilized by heat treating, so that it will not distort and throw the bearing out of alignment. Since the laminated components are assembled into a completed bobbin with Phillips head screws, parts can be readily replaced.

Pirns or guide bobbins used in weaving are now being successfully fabricated with plastic parts. For example, Synthane has designed a pirn which is being used by E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., in winding large packages of nylon yarn at especially high rotational speeds. This pirn is composed of a barrel and a cone-shaped section made of phenolic-paper laminate, plus two compression molded flanges. These parts are held in a rigid assembly by a flanged stainless steel tube.

In the production of rayon yarn in cake form, a special device called a cake expander is required. Such an

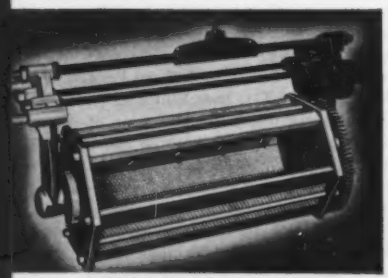
Courtesy The Formica Co.

Paper phenolic laminate sheet, cured and post formed, becomes a barrier used in a circuit breaker to eliminate arcing



Courtesy North American Aviation, Inc.

Resiliency of phenolic terminal strip cover (top) permits easy installation



Courtesy The Formica Co.

Ends, side panels of electro-plating barrel are fabricated from chemical-resistant phenolic-cotton duck laminates

expander, using five laminated parts, has been designed by The Plasticbilt Corp., Greenville, S.C., and the parts are being produced by National Vulcanized Fibre Co., Wilmington, Del. Three of these parts are post-formed to fit perfectly inside the rayon cake. (See illustration, page 74.) Two disks, one for the top and one for the bottom, are machined from flat stock. The post-formed sides are suspended on springs so that a constant pressure is exerted by the sides on the inside of the cake. The cake expander is mounted on the winding machine.

Spinning Buckets

Westinghouse Electric Corp., Pittsburgh, Pa., has been producing laminated spinning buckets for the rayon industry for some time and has recently come up with a redesigned bucket which has several advantages over its predecessor. Because the new bucket is lighter in weight, it can be started and stopped much easier and quicker—a decided advantage because of the extremely high speed at which these buckets rotate. Further, the new buckets require less effort in handling, which is of prime importance when up to 100 buckets are used on each frame of a textile machine.

In redesigning these spinning buckets, the wall section of the sides was reduced from ½ to 5/16 inch. In both the old and new design, a helix of reinforcing wire is embedded in the wall to add to the strength of the part. In the old bucket, this reinforcing wire was close to the outside wall; in the new design, the wire is in the exact center of the wall section. Even though the wall is now 3/16 in. thinner than it was previously, the new buckets have greater strength and can withstand greater rotational speeds. This is due to the balanced wall sections, which have eliminated heavy initial strains that were set up in the former design by the uneven shrinkage of the different thicknesses of the laminate.

More Next Month

A second article on industrial high pressure laminates, to be published in our September issue, will cover mechanical applications such as gears, bearings, etc. The present article and the one coming next month will together give a clear-cut picture of these laminates and their present and potential uses.

In producing these buckets, a preform for the inside part of the bucket is made up of strips of impregnated paper and is partially cured in a mold. It is then removed from the mold, set up in a lathe, and a spiral groove is machined on the outside diameter to hold the reinforcing wire in place. The wire is then formed into a coil of the correct length and snapped into position in the machined groove, after which the outer shell is preformed and slipped over the wire. The entire assembly is then placed in a mold and cured under heat and pressure. The final operation consists of loading this laminate shell into another mold, which is so designed that macerated material may be transfer molded to form the hub of the bucket.

Although there are many more applications of laminates in the textile industry, those just described—plus additional ones illustrated—indicate the widely spread impact which these types of plastics are making on textile production equipment design.

Electrical Applications

In the electrical field, "printed circuits," while still using only a comparatively small percentage of laminate production, appear to be headed for a sudden and large increase. This potential increase is

Courtesy Synthane Corp.

"Sandwich" washers, made of laminated phenolic and rubber, seal oil-filled condenser terminals. Plastic provides rigidity; rubber makes flexible seal. Sheets from which washers are made are bonded in laminating press

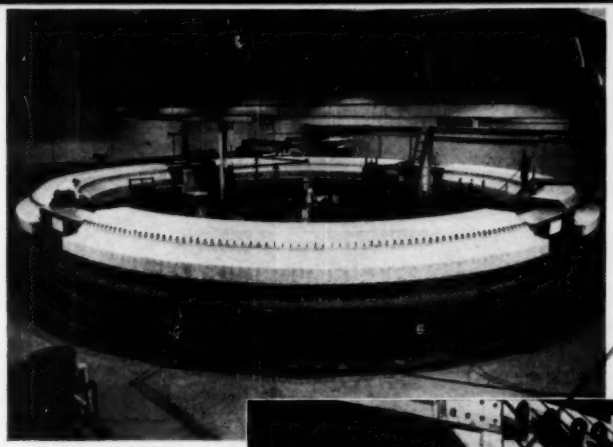
foreseen by the fact that printed circuit components are being designed more and more into guided missiles, proximity fuses, and other electronically controlled devices which require miniaturized circuits that will continue to function under rough treatment and at elevated temperatures. In addition, the favorable cost factor indicates that printed wiring and components will be used more in radio and TV. sets.

Printed Circuit Production

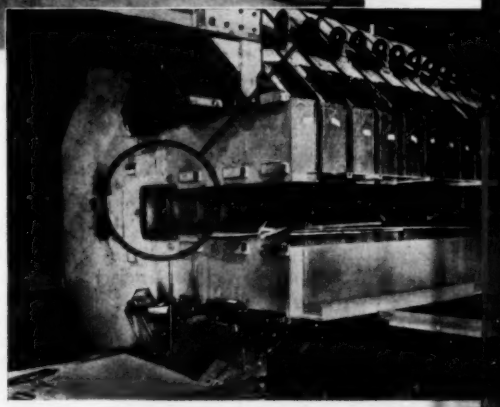
Production of printed circuits has been accomplished by several different methods, but the use of metal foil-clad laminates upon which a circuit is etched has many advantages over other methods and materials. (See "Printed Circuits on Foil-Clad Plastics," page 99).

The acceptance of printed circuits for use in consumer products where cost and not miniaturization is a factor is pointed up by the fact that the Syracuse, N.Y., plant of General Electric Co. plans to incorporate from one to three printed circuit units in its television sets, beginning this fall. These units will probably use copper-clad phenolic laminate.

These foil-clad laminates are now manufactured by most of the laminators, with Synthane and National Vulcanized Fibre leading the field, and the others following close behind. In most of the production to date, 1/16-in. grade XXX-P paper base phenolic laminate has been used, although certain electronic ap-



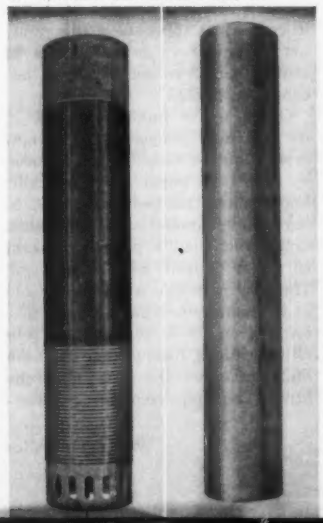
Photos Courtesy The Formica Co.

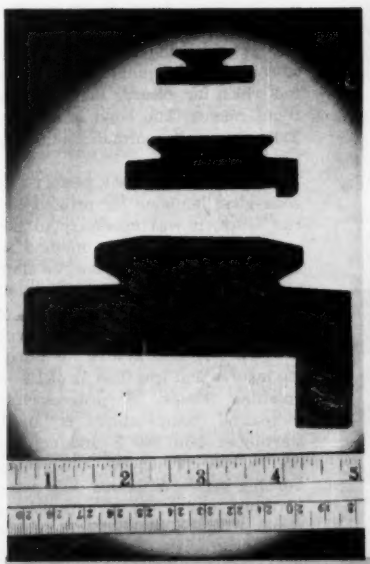


Key to giant atomic accelerator (above) is a large magnet ring made up of 288 sections (portion shown at right) and insulated by cotton base phenolic laminate. Gap insulators, located at base of U-shaped slots in octagonal-type magnet slabs, are post-formed about 8 1/4 in. wide and 7 in. deep, with legs 11 1/2 in. long. Flanges varying from 1 3/4 to 3 in. are molded, and the whole insulator is assembled with a special type of phenolic adhesive

Below, right: Silicone-glass coil form before machining. Left: After machining spiral wire grooves and open end slots

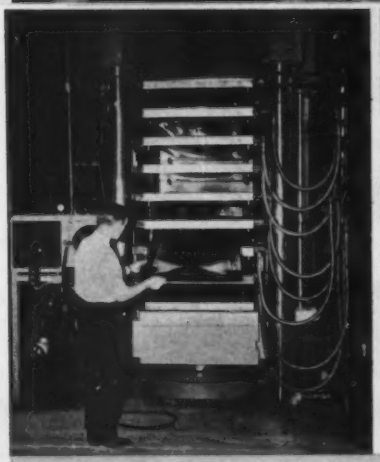
Courtesy Federal Telecommunication Labs, Inc.

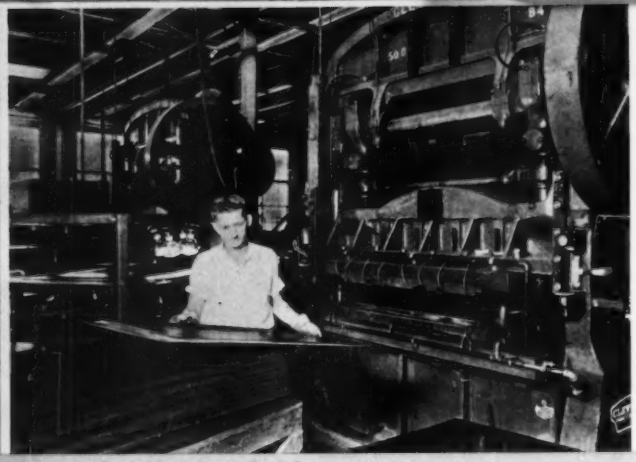




Photos courtesy Micarta Div., Westinghouse Electric Corp.

Above left: Polyester asbestos paper laminated pieces are used to replace mica as commutator insulation in auto generators and starting motors. Right: Building up a commutator with laminated sections. Plastic will wear with commutator segments, eliminating arcing and undercutting





Photos this page courtesy Chemical Dept., General Electric Co.

Removing a laminate refrigerator door liner from one of the molds in a multi-platen press

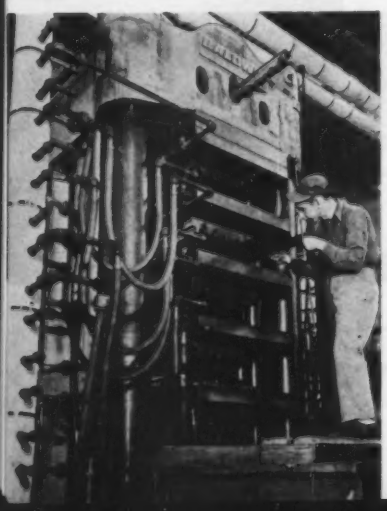
Laminate inner door liners are trimmed to correct size with a blanking machine. This operation also punches ventilation holes and, in addition, provides slots for attachments

plications are making use of a silicone-fibrous glass cloth as a base, simply because the circuits must withstand temperatures above 300° F. for long periods of time. Styrene impregnated glass cloth and polyester laminates have been tested, and may be used where exceedingly high electrical properties are required. The metal foil most commonly used is electrolytic copper sheet, although experimental work is now going forward on brass and aluminum foil for large volume work.

Use of high temperature resistant silicone-glass based laminates for printed circuits was held up for some time because of the difficulty of obtaining a suitable bond between the metal foil and the laminate surface. A short time ago, General Electric's Chemical Div., Pittsfield, Mass., produced a new adhesive, known as G.E. 81267 Primer, which is claimed to bond silicone rubber satisfactorily to almost any surface. The Laminating & Insulating Products Dept. of this company, at Coshocton, Ohio, began experimenting with this adhesive, and today is producing a bond between silicone-glass laminate and metal foil which far exceeds the minimum requirements. The bond is made at 250° F. under normal laminating pressures.

In order to produce a perfect silicone-glass laminate for printed circuit work, it was necessary to develop a more efficient method of burning off the sizing from the cloth before impregnation. Previous methods left a high percentage of size in the cloth, produced a brownish result. A new system for burning insures that less than ¼ of 1% of volatiles remain. A progressively increasing temperature is used, starting at about 900° F. and increasing to 1200° F. at the end of the burning cycle. With this high temperature, practically all the size is removed, and a pure white laminate instead of a brownish material is produced.

Refrigerator breaker strips, molded of laminate, being removed from a press

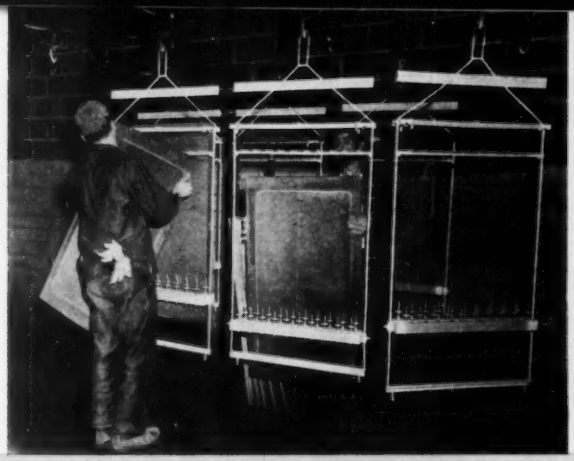


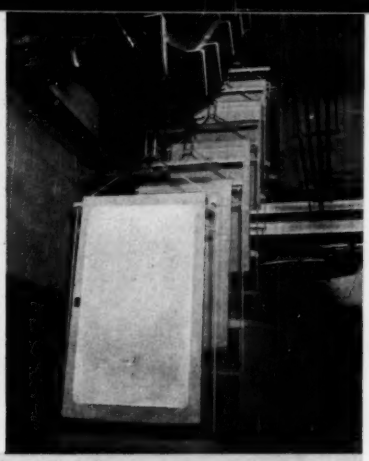
Panel Boards

During World War II, the Navy made use of large sheets of expensive melamine glass cloth laminate in panel boards. The latest panel board development by the Navy, which has a number of advantages, including reduced cost, involves steel panels with inset laminate blocks to which the switches, breakers, fuse boxes, and other electrical instruments are fastened. The blocks, which provide insulation, are machined to size and shape from a newly developed type of melamine-glass laminate.

General Electric, among other laminators, is producing the material for these blocks from glass mat instead of glass cloth. Woven cloth costs $1.75 per pound; mat costs 70¢ per pound. The change in filler material, plus the fact that comparatively small size blocks are being used instead of entire panel boards, has resulted in a sizeable reduction in cost. Final approval of this product by the Navy is being delayed until a second source of supply becomes available.

Of particular interest because of its electrical properties is a new type laminate now being produced by G.E. from paper and a phenolic impregnant. This laminate is replacing another material of the same type which had a power factor at 60 cycles of from 35 to 40 percent. The new material, while being sold at the same price, has a power factor of from 10 to 15 percent. From all indications, little change has been made in either the varnish or the filler. The improvement in prop-





Photos this page courtesy Chemical Dept., General Electric Co.

At the beginning of the painting operation, laminated inner door liners are snapped into place on conveyor which goes to the paint booth and baking ovens

After painting, plastic refrigerator door liners are conveyed to ovens where finish is baked

erties is due to close control of the varnishing as well as the laminating operation.

Insulation

Automobile generators and starting motors are also being made better through the use of a plastic laminate. Mechanics who repair these units are only too familiar with the time-consuming operation which is required when motor or generator commutators have to be turned down because the copper segments are worn and pitted. It is fairly simple to turn down the metal, but difficulty is encountered when undercutting the mica used as insulation between the commutator segments. This is a hand operation and is necessary because the mica extends slightly above the surface of the commutator segments and the mica will cause arcing if it is not undercut.

This problem is being eliminated by the use of a polyester asbestos paper laminate which is molded at standard high laminating pressures in the required thickness to replace the mica insulation between the commutator segments. Westinghouse Electric is now furnishing one of the large automobile manufacturers with this insulating material, die-cut to size by the laminator and shaped to its final form by the end user. It is stated that this polyester asbestos laminate will chip away smoothly and uniformly as the commutator segments wear, and at no time will it protrude above the surface to cause arcing and subsequent pitting of the commutator bars.

Among other electrical applications of laminates are large formed barriers produced by Formica for use in large circuit breakers to help eliminate arcing when the breaker opens. To produce this barrier, a sheet of special paper-phenolic laminate is cured and then post-formed to the required shape.

Various types of electrical insulating spacers are being produced by Taylor Fibre Co., Norristown, Pa. Nylon-phenolic and nylon-silicone sheets are first molded and then machined into various sizes and shapes for several companies who are producing electronic equipment for military use. Among the civilian applications being produced by this company is one made from melamine-glass for use in toasters. It is being produced for Toastmaster Products Div., McGraw Electric Co., Elgin, Ill., and is used to replace certain mica spacers which were fragile and broke easily. According to Toastmaster, the melamine-glass spacer is used to insulate the heating element from the frame parts of the toaster, and to reduce current leakage to a minimum. It is stated that this laminate insulator is particularly suitable for this application because of excellent dielectric properties at elevated temperatures.

Excellent physical and electrical properties are required in a tubular coil form being produced from a

Point-of-sales label (upper right-hand corner of door) explains merits of laminated liner

silicone-glass laminate by National Vulcanized Fibre Co. for Federal Telecommunication Labs., Inc., Assoc., I. T. & T., Nutley, N.J. The finished dimensions of this tube are 28¼ in. long and 5½ in. in diameter with a wall thickness of approximately ¼ inch. The coil form is used in a new automatic antenna tuning unit for U. S. Navy radio transmitters. This automatic unit makes possible the use of one transmitter instead of several which were previously required to cover the different frequencies used. The sets are equipped for either pushbutton or dial tuning.

The silicone-glass tube is machined to its final form at Federal. A spiral groove is ground on the

(*Continued on p.* 176)

BLACK LIGHT DISPLAY

Molded-in letters on sign are sprayed with luminescent paint. Ultra-violet light makes sign look like neon sign

Three styrene parts of display are, left to right: white sign frame; red sign; white rack with integral reflector

THREE molded styrene pieces make up the striking utility tray and advertising sign being distributed to bars and cocktail lounges by the manufacturers of Miller High Life beer. The sign has molded-in letters which are sprayed with luminescent paint and lighted with ultra-violet light to give an effect similar to that of a neon sign.

The combination tray and sign is made by Loma Plastics, Inc., Fort Worth, Tex., for American Neviol Sign Co., Fort Worth, which holds the United States rights to this type of black light advertising sign. The main advantage of this type of sign is the elimination of the disadvantages of a neon glass tube sign, such as the fragility of the glass, high cost, the need for high voltage transformers, and the inability to reproduce script or trade mark insignia in small signs.

The Miller High Life sign, which also acts as a rack for paper napkins and swizzle sticks, was designed for American Neviol by Karl Brocken Associates, Milwaukee, Wis. The sign consists of three parts: 1) the sign proper, an almost-flat piece 5¾ by 10½ in.; 2) a frame for the sign; and 3) the rack, which is 13¼ in. wide, 8 in. deep, and 3½ in. high. The sign is molded of red styrene, and the other two pieces are white.

Molds for the three pieces were designed by Loma and the mold maker, Libbert Tool & Die Co., Fort Worth. A single-cavity mold was made for the sign with interchangeable plates for carrying the advertising message. Thus the mold can easily be converted to produce a similar sign for another advertiser. The letters on the sign were made twice as thick at the top as at the bottom. This difference is not apparent to the observer, but it angles the letters so that they reflect the maximum amount of light.

A second mold was made to produce the frame and the tray. This two-cavity mold was necessarily unbalanced because the frame is a simple piece which weighs only 82 g. while the tray weighs 570 g. and necessitated 12 cores to form the various compartments. The mold was designed as a two-cavity split plate die with a single 0.040-in. gate on the frame and a 0.060-in. pin gate on the tray. This mold runs at a cycle of 75 shots per hour.

The original design for the tray piece involved a metal reflector under the ultra-violet lamp. However, Loma found that the efficiency of the reflection could be improved by eliminating the metal piece and molding a white styrene curved reflector as an integral part of the piece. Tests showed that only 73% reflection was obtained from the metal reflector and 92% from the styrene. The elimination of the metal piece reduced costs and simplified assembly.

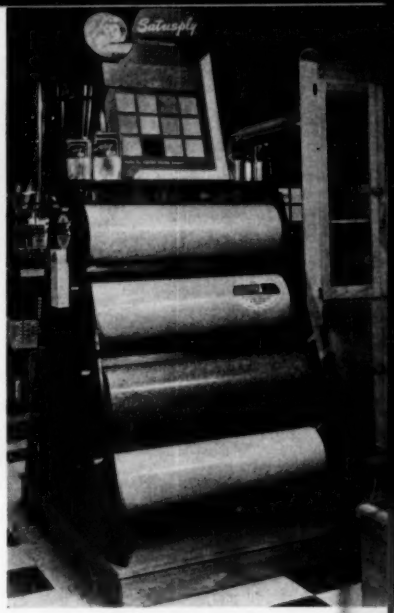
After molding, the red sign requires two spray operations. A flat base white undercoat is put on first, and the luminescent material is then applied. Electroformed copper masks for these spraying operations were made for Loma by Conforming Matrix Corp., Toledo, Ohio. No difficulty was encountered in the spraying operation, but Loma found that better results were obtained and less bleeding occurred if the mask exposed only part of the sides of the letters instead of fitting closely to the base of the letters.

The Miller High Life emblem and slogan on the flat front surface of the tray is silk screened.

All the electrical parts of the sign are contained in a metal box which is attached to the plastic tray with two self-tapping screws. Two more screws are used to attach the frame and signpiece to the tray.

Photos courtesy United States Rubber Co.

Worn linoleum surface of sink cabinet can be replaced by the home owner with easily applied polyester decorative laminate having a solvent-activated cement on the reverse side



Flexible decorative laminate, available in rolls up to 60 lineal ft., can be displayed on racks. Exact amount needed can be cut from roll and carried home by buyer

The Glue is on the Back

AN important contribution to broader usage of decorative laminates by the home handyman has been achieved by United States Rubber Co., producer of Satusply polyester decorative laminate. Satusply is now available with its back surface pre-coated at the factory with a cement which can be immediately activated by means of a solvent. The material can then be quickly and permanently applied to suitable surfaces with simple tools and hand pressure. Thus even an amateur can turn out a professional looking installation.

Pre-cemented Satusply can be easily applied right in the home. By following suggested methods of application, it can be used for resurfacing worn out sink tops, pantry ledges, bars, and counters. It can also be used to give a "face lifting" to end tables, desks, coffee tables, chests of drawers, or other pieces of furniture on which the original tops have been scratched or marred by stains or cigarette burns.

An important feature of Satusply in addition to its ease of installation is that it is produced as a continuous laminate and sold directly from rolls available in lengths up to 60 lineal feet. Thus the purchaser may buy any specific length of material required for the job, reducing waste to a minimum. The continuous length means that even long surfaces, such as bar and counter tops, can be covered without joints. The light weight of the material and the fact that it can be rolled up make it possible for the consumer to carry the laminate home easily.

At present, Satusply is available in 30 and 36 in. widths, packed in standard rolls, or in sheets 36, 72, 84, and 96 in. in length. The material is made in 13 colors in five different patterns and in five wood grains. The net price to dealers ranges from 54 to 64¢ per sq. ft., depending upon quantity.

Satusply has all the characteristics of polyester laminates—acid and alkali resistance, stain resistance, abrasion resistance, and resistance to discoloration by light, heat and aging. In normal service, it successfully withstands boiling water, fruit acids, alcohol, and excessive wear. Satusply is also unharmed by contact with burning cigarettes because it incorporates a heat-diffusing layer of aluminum foil. In general, its physical properties and characteristics, according to the manufacturer, are equivalent to those of the high pressure laminates.

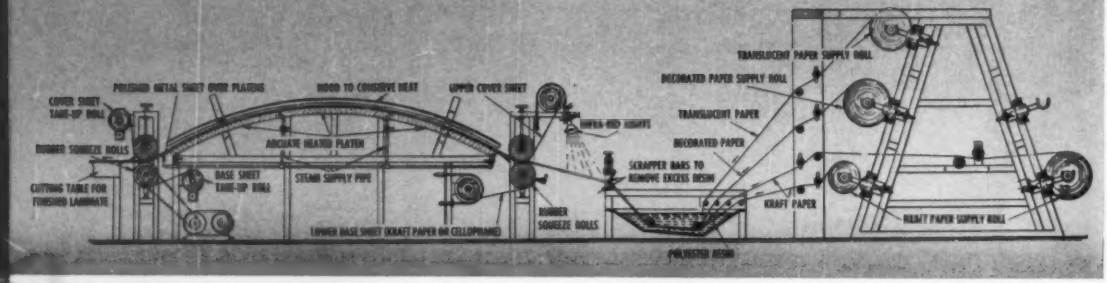
Method of Production

The production process used in making Satusply differs in mechanical details from that customarily used in producing polyester continuous laminates. The Satusply method and equipment, covered by two U.S. patents, eliminates the usual tentering mechanism for holding the impregnated sheets taut during the curing process. Instead, the material is cured by advancing it over the convex surface of an arcuate heated platen, with uniform pressure exerted by means of a flexible pressure sheet stretched over the resin-impregnated sheets.

By passing the saturated plies over the arched platen, which is zoned for sectionalized heat control, an "ironing" type of action is obtained, resulting in a finished laminate with exceptional uniformity. The Satusply production method is illustrated in an accompanying diagram.

Printed papers used in Satusply are supplied mainly by Morart Gravure Corp. and Decotone Products

METHOD OF PRODUCING CONTINUOUS POLYESTER DECORATIVE LAMINATE



Div., Fitchburg Paper Co. All resins used are of the polyester type. No one resin is used exclusively; U. S. Rubber has blended various resins, including Vibrin, Laminac, Selectron, Plaskon, Paraplex and Marco.

The adhesive is applied to the back of the laminate by continuous process. With the reverse side up, the roll of material is fed past a nozzle which covers the surface with adhesive. Even distribution is obtained by means of a doctor blade. After passing through a drying tunnel, the web of adhesive material is sprayed with a non-blocking agent and the laminate is rewound preparatory to packing in sturdy tubular containers. Among the ingredients in the adhesive is an aluminum powder which increases the heat resistance of the laminate.

Satusply can be applied to base surfaces of plywood, tempered hard board (such as Masonite), transite, metal, or equivalent materials. The surface must be smooth, clean, dry and free from oil, grease, paint or wax. Specific directions covering application method, trim, etc., are given in a booklet supplied with each purchase of Satusply. The procedure is illustrated on page 83.

Method of Distribution

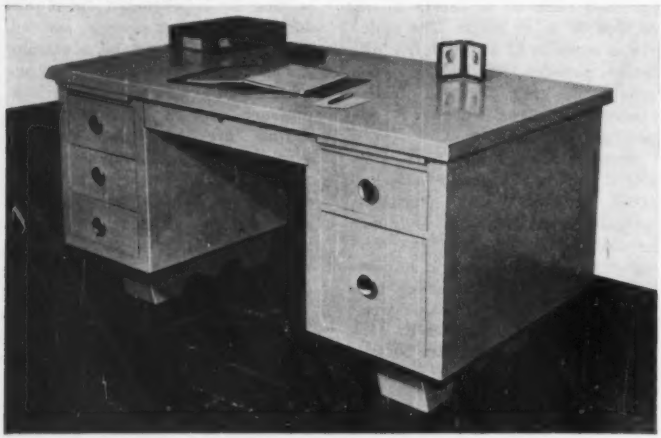
Satusply was originally sold on a national basis, through distributors. In January, 1950, U. S. Rubber discontinued sale through distributors and began selling the material directly to the dealer through its own special sales staff, limiting sales activities to the Mid-western states of Indiana, Illinois, Michigan, Ohio, Wisconsin and Missouri.

The material is being sold in some 800 retail outlets in the states specified, including lumber companies, floor covering stores, department stores, cabinet shops, hardware stores, building supply stores and appliance stores. Future plans are to expand distribution to other areas when production can be increased sufficiently to service additional outlets.

U. S. Rubber Co. provides its dealers with numerous sales aids, such as counter display units, newspaper mats, suggested spot radio announcements, mail-out inserts, sample books, and over-the-counter instruction sheets.

U. S. Rubber also provides a field service organization of factory trained men who are available to the dealer free of charge. They function as instructors of mechanics who are making a contract installation in a home for the first time. The company points out that such a service is not necessary where the material is sold over the counter to an individual who will make the installation himself. In a period of a year and a half, only one consumer who has followed the instructions and made his own installation has registered a complaint with the manufacturer.

All surfaces, including drawer fronts, of worn desk were covered with polyester laminate without professional aid, converting it into an attractive piece of modern furniture
Courtesy United States Rubber Co.



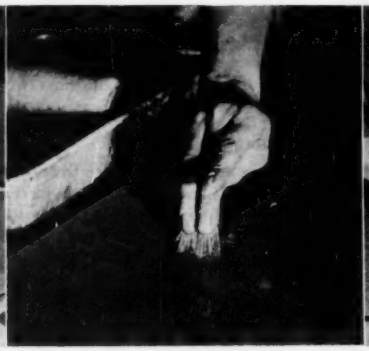
HOW TO APPLY PRE-CEMENTED LAMINATE

1 Pre-cemented laminate comes in rolls up to 60 lineal feet. It can thus be used for covering long bars or counters without seams, or can be used for small jobs with little waste

2 Exact length needed can be cut from the roll with simple tools such as a linoleum knife or scissors. Another method is to score the material, then break it

3 After the material is cut to the desired length, the sizing is applied to the base surface with an ordinary paint roller. Sizing is allowed to dry at least 7 minutes

4 The solvent is then applied to the back of the laminate to activate the factory-applied adhesive. Even distribution can be checked visually because activated adhesive darkens

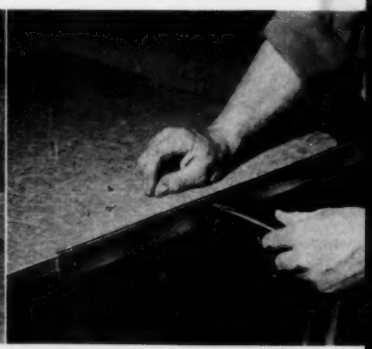


5 Activated adhesive is usually ready to apply in about 3 minutes. A finger test is used. When the adhesive breaks when pulled about 1 in. from surface, it is ready

6 The laminate is smoothed firmly onto the base surface with hand pressure. Strokes are made towards outside edges to remove air bubbles between laminate and base

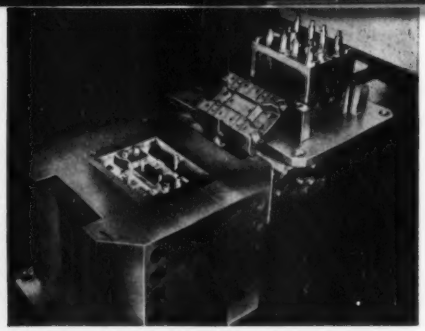
7 Laminate, which has been cut slightly larger than the surface to be covered, must be cut to exact size after it has been applied. Scribing tool used is guided by edge of base

8 After laminate has been scored, excess material can easily be broken off. When marking material, slight allowance is made for possible expansion of the material



9 Final step is the application of suitable trim to the edges. In this case, metal edge molding is screwed to the plywood base of table top to finish off the job neatly

Light fixture (left) for diesel locomotive engine room requires socket able to withstand high temperature and constant vibration. Socket, right, molded of organic cold molding compound, is shown (center) in place in base



Die and molded piece for heavy duty meter socket block which must have dimensional accuracy, stability, and arc resistance. Block, molded of new compound, is 6 in. long, weighs 3 pounds

Organic Cold Molding Compound

MANY specialized electrical applications have been found for an organic cold molding compound which combines the desirable characteristics of inorganic cold molding materials with the better strength characteristics found in hot molding materials. The material, called Rosite 2000, consists of a low percentage of standard phenolic resin (about 15%) and a special mineral filler. It is made and custom molded by Rostone Corp., Lafayette, Ind.

Rosite 2000 has almost as high resistance to heat and carbonization as inorganic cold molding materials and has two to three times the strength of those materials. It has good dimensional stability and will take molded-in inserts.

The material is mixed cold with intensive type mixers and molded cold in hardened compression-type dies. Pressures ranging from 8000 to 10,000 p.s.i. are used. The pressure is applied rapidly, with little or no dwell required, and cycles as fast as 1 sec. can be achieved on small items.

After molding, the parts are baked at progressive temperatures of 180 to 350° F. over a total period of about 5 hours. Deflashing and any other necessary finishing work is done after curing.

Applications

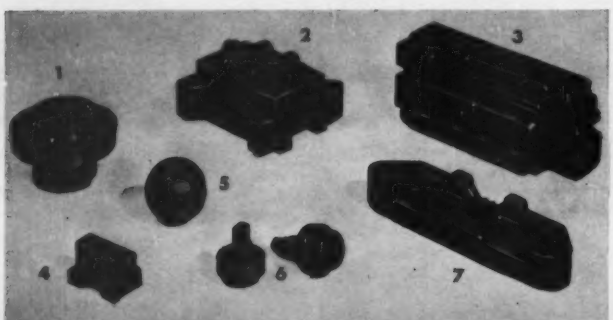
One application where Rosite 2000 is used is the socket in a high temperature light fixture for the engine rooms of diesel locomotives. The part has to withstand high temperatures and must have sufficient strength to stand up under constant vibration.

Another application, a watt-hour meter block, illustrates the complex shapes which can be molded with the material. This application required dimensional accuracy and stability, arc resistance, and nonflammability. A socket meter block with the same requirements has also been molded of Rosite 2000. One heavy duty socket block, which is only 6 in. long, weighs about 3 pounds.

Among the other electrical applications of the material are: a contact carrier for a magnetic motor starter, knobs and push buttons which must have dimensional stability at elevated temperatures, and a contact base and arc shield for a pressure regulator controller.

Although Rosite 2000 is not yet available to molders, the manufacturer of the material is prepared to custom mold parts which require high temperature resistance, arc resistance, and greater mechanical strength than can be obtained in inorganic cold molding materials. Rostone Corp. has also developed another material, Rosite 2100, which uses melamine resin as a binder. The main difference between this and the phenolic-bonded material is an increased arc resistance (260 sec. under the A.S.T.M. standard arc test procedure as against 120 sec. for Rosite 2000).

Left: Various parts produced from new molding compound—each demanding one or more specific electrical properties—are: 1) light socket; 2) terminal block in disconnect switch; 3) watt-hour meter block; 4) contact carrier for motor starter; 5) knob; 6) push buttons for magnetic motor starter; 7) socket meter block. Right: Small meter socket block (7 in photo, left) being taken from die



Filters for Color Television

by JOHN W. CHRISTENSEN*

COLOR television broadcasts recently inaugurated by Columbia Broadcasting System require a considerable use of plastics for their successful operation. The blue, green, and red filters used in the CBS color system employ either a color-dyed cellulose acetate sheet or a clear acetate sheet upon which has been deposited a film of color gelatin. The rotating disk or drum on which they are mounted is made of acrylic.

In the CBS system, color can be produced either entirely electronically or with mechanically moved color filters. The latter are being used, since at present they yield pictures of higher color fidelity and are more dependable and trouble free than other methods.

The filters are being used in various forms. In projection-type sets, small color disks are interposed between the tube and the projection screen. Color drums are being used for large tubes. These drums completely envelop the tube, with the drum axis horizontal and perpendicular to the tube axis.

The most frequently used type of moving filter, however, is the color disk which is mounted so as to rotate in front of the tube face and as near the tube face as possible. In general the size of the disk is determined by the size of the tube raster (the illuminated portion of the tube), the position of the disk with reference to the tube, and the number of filter segments used.

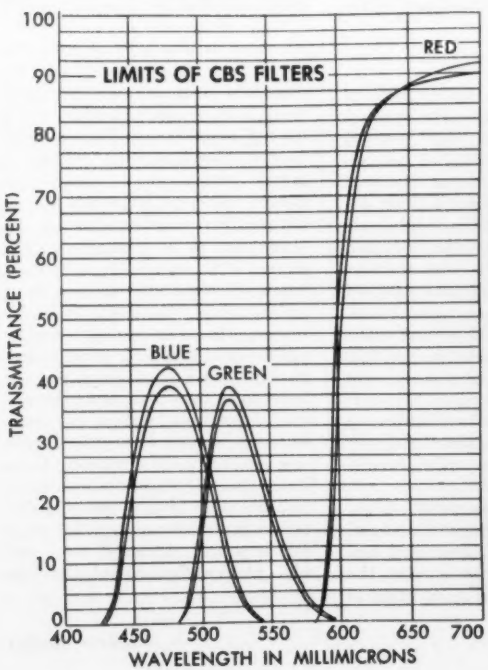
The minimum disk size is that in which the raster appears in one of the quadrants of the disk. A practical disk thus needs to be only slightly larger than twice tube size. Such a disk has six segments and rotates at 1440 rpm. A typical color drum employs either 9 or 12 filter segments and rotates at 960 or 720 rpm. respectively.

Optical Requirements

The color filter material used must have spectrophotometric transmission characteristics within the limits of the standard CBS filter curves. If the filters do not transmit the right percentage of each wavelength of light, it becomes impossible to obtain the proper overall color fidelity of the received pictures. The adequacy of a questionable filter material can be determined only by measuring its transmission characteristics on a precision-type instrument such as the General Electric recording spectrophotometer.

It is also extremely important that the pair of each color used in a color disk be closely balanced for optical transmission. The green filters must not have a differential luminous transmission greater than 1.5%, the red 3.0%, or the blue 4.5%. With much of the filter material used today, this means that the maximum thickness differential between units of a pair of color filters used in a disk must not exceed 1.3% for green, 6% for red, and 6.5% for blue. Any greater variance will cause a flicker in the received picture. The luminous transmission is determined by both the dye density

*Chief engineer, Engineering Research & Development Dept., Columbia Broadcasting System.

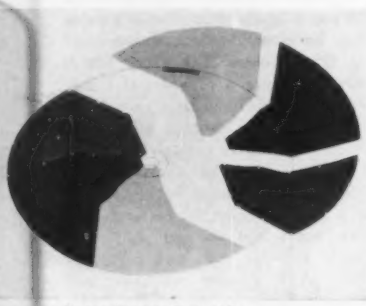


Television receiver can be converted to receive CBS color telecasts with unit containing acrylic disk with acetate filters riveted to it. Filters must have transmission properties within the limits of curves shown at left

Illustrations on this page courtesy Columbia Broadcasting System

Courtesy Columbia Broadcasting System

Loose riveting of filters to disk allows for differential dimensional changes



Courtesy Monsanto Chemical Co.

Acrylic color disk has six acetate filters, two each of red, blue, and green

and the thickness of the filter material used.

Many manufacturers have produced color filter materials with the desired spectrophotometric characteristics. Much of this material was unusable for color disks, however, because the particular production process used by the manufacturers was found inadequate for producing material of the necessary thickness tolerance. For example, material produced by extrusion or casting methods (20- by 50-in. sheets) has been found to contain too high a percent thickness variance for use in the disk. Some cake slicing procedures on the other hand have been found satisfactory. At present, adequate color filter sheets are available from three suppliers: Monsanto, Eastman Kodak, and Harrison & Harrison.

Mechanical Requirements

The disk or drum must be constructed of a material which will remain planar under the varying conditions of temperature and humidity encountered in normal use. Acetates and some acrylics are unsatisfactory because of warpage or creepage with time. When exposed to the approximate internal cabinet operating temperature of 140° F., hard U V Lucite and hard Plexiglas have been found satisfactory. Vinylite and similar materials are satisfactory mechanically, but induce a light loss not present in acrylic, due to their lower optical transmission. At the time of this writing, a new acetate is under test which it is hoped will be adequate from both a mechanical and an optical standpoint.

The disk should be as thin as possible consistent with the necessary rigidity. Excessive thickness results in a disk with an undesirably high moment of inertia. Under certain conditions, very thin disks can be used because the centrifugal force during operation stretches them into a planar form. Most of the disks used in the CBS equipment employ 0.060 in.-thick hard U V Lucite.

In order to operate with a minimum of noise and vibration, the disks should be balanced to an equivalent of $\frac{1}{5}$ g. or less at the periphery of the disk. This balance is achieved by attaching a thin precalibrated small flat brass counter weight in a dead optical area of the disk.

Making the Disks

Since all color filter sheet material presently available is of acetate, while suitable "back bone" material is of acrylic, assembly of the two poses many interesting problems. If the new acetate presently being developed is found to have adequate mechanical characteristics, it would seem that a laminated disk employing this material offers an excellent solution. It has been found, however, that some of the acetate colors change their transmission qualities during a laminating process, and further work is required before it will be known whether laminating procedures may be developed that will not induce these color changes in the filter material.

Another fabrication method is one in which the acetate color material is sandwiched and laminated between two sheets of acrylic, the acrylic over-lapping the acetate at the edges and center of the disk. The difficulties with this type of construction have resulted from apparent reaction of the plasticizers of the two materials, fogging the optical transmission of portions of the disk.

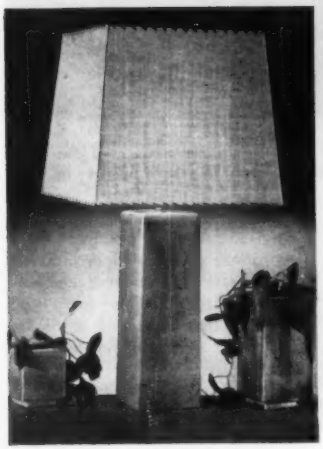
Another method that is at present under development, and looks promising, is injection molding. The separate disk segments are injection molded to the thickness required, then edge joined into the completed disk. Rohm & Haas and Bakelite have developed powders suitable for injection molding, which at present have nearly the required spectrophotometric curves. Shiplap or tongue and groove joints may be employed in the pie segment molds to facilitate assembly of the segments into the completed disk.

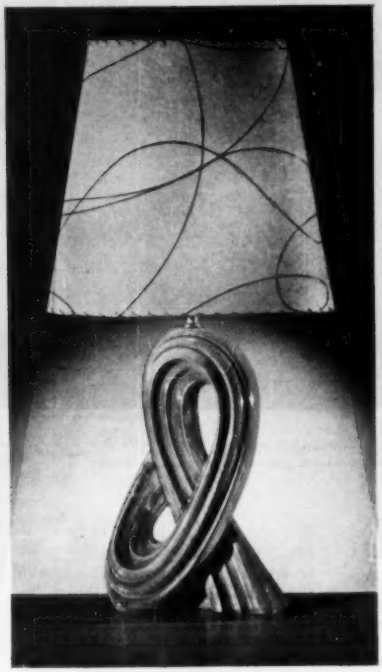
The method most extensively used in the production of disks to date is one in which the acetate filters are riveted to the acrylic supporting disk. Disks in which the acetate filter material has been tightly riveted or cemented to the acrylic have proved unsatisfactory due to bulging or pulling. Thus, loose riveting is employed; the rivet holes in the filter material are of larger diameter than the rivet shank. This permits differential dimensional changes between the filter material and the acrylic without strain in either material.

Color disks and drums are employed in various types of units. For converting existing sets to color, the disks are used in converter units which may be slid back and forth in front of adapted sets. They are also used in "slave" units or "companion pieces" which can be attached to present black and white sets to permit reception of color pictures.

The sets to be available on the market at an early date operate on either the black and white or color signals from the same tube. To achieve this, a color disk assembly composed of two color disks is employed. One half of the filters are fastened to each disk. For color operation the disks rotate so as to present the usual six-segment color disk appearance. For viewing black and white, the disks are rotated so that the clear area on one disk lies under the clear area on the other disk to permit viewing of black and white pictures through only the clear acrylic.

Heat Sealed Lamp Shades





Photos courtesy Bradley Mfg. Co.

Lamp shades made of glass fibers and vinyl resin have heat sealed seams, are stronger than cemented shades

ELECTRONIC fabrication of lamp shades is made possible through the use of sheet materials combining glass fibers and vinyl resin, producing a thermoplastic, heat sealable product. The material also presents a wide range of decorative opportunities, because it can be made with various fiber arrangements and in numerous colors. In addition, the material can be decorated by silk screen or other process to produce endless designs.

Shades which are seamed on high frequency sealing equipment similar to that used in fabricating beach balls, raincoats, inflatable toys, and other sheet vinyl products have several advantages. The seams, which need be no more than 1/16 in. wide, are uniform, inconspicuous, and represent a considerable saving in material when volume output is involved. The fact that seams are made in only a few seconds increases output per operator and lowers manufacturing costs. Finally, the finished product is not only pleasing in appearance, but actually stronger than shades having cemented seams, since the material is literally welded to itself by the dielectric heating equipment.

Bradley Mfg. Co., Chicago, Ill., and Paterson Shade Co., Paterson, N.J., are among the firms now using this production technique. A brief review of their manufacturing operations illustrates the adaptability of electronic equipment to the lamp shade field and suggests future uses.

Glass fiber shades produced by Bradley are made of Polyplastex, a combination of fiber glass and modified vinyl resin manufactured by Polyplastex United, Inc., Bronx, N.Y. The Bradley shades are made in several styles, colors, and designs.

The material used by Bradley ranges in thickness from 18 to 20 mils. It comes to the plant with the shade sections custom die cut, ready to be made into shades of any desired type—drum, octagonal, square, "coolie," cone, etc. If a decorative pattern is to be applied, this is done by silk screen process, using special inks blended in the plant to meet the manufacturer's specifications. After application of the design, the sheets are placed on conveyor belts which carry them through the drying operation, with heat supplied by banks of infra-red lamps and followed by air blast cooling. Drying time ranges from 2½ to 3½ min., depending upon the relative amount of ink required by the pattern.

The next operation at the Brad-

Photos courtesy Bradley Mfg. Co.

Glass fiber sheet for Bradley shade, to which design has just been applied with specially prepared inks, is placed on belts which carry it past infra-red lamps for drying

Rotary punching tool perforates glass fiber sheet permitting shade to be secured to frame by lacing

ley plant consists of punching the edges of the pre-cut sheets so that they can be laced to the wire frames or rings. This is done rapidly, several sheets at a time, by feeding the material through a rotary punching device which produces clean cut, evenly spaced openings.

At the present time, electronic seaming operations on the Bradley glass fiber shades are performed on two high frequency units manufactured by J. A. Callanan Co., Chicago. One is a 2-kw. machine and the other is rated at 1 kw. However, Bradley production men state that a 1-kw. setting adequately meets all their sealing requirements. Both high frequency machines are fitted with open jaw-type presses and air cylinders which actuate the electrodes. Foot control switches regulating clamping and power application enable operators to use both hands for handling the glass fiber material, and positioning it properly in the presses.

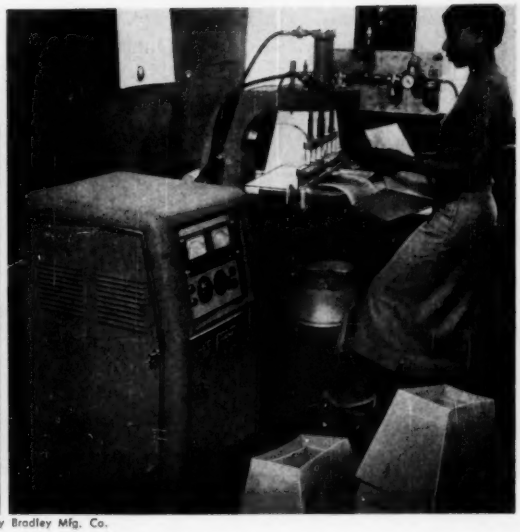
Sealing time depends to some extent upon the width of the shade, but usually includes about 1 sec. preheat and 1 sec. actual welding time. The electrodes, consisting of brass or copper strips, are made by Bradley in its own shops. The operator brings the edges of the sheet material together in proper alignment, then lowers the electrode so that the piece or pieces to be sealed are firmly clamped. Then the power is applied and the seal completed. When sealing material which has been printed with metallic colors, operators first apply a strip of vinyl industrial tape to the electrode to eliminate sparking and obtain a better seal.

In the final operation at Bradley, a vinyl-coated cord-type material is used to lace the glass fiber material to the upper and lower rings. The seams of the shades are rigid enough so that additional wires are usually not required between the rings themselves.

At Paterson Shade Co., a slightly different process is followed because of a difference in shade construc-

Courtesy Paterson Shade Co.

In Paterson's plant, sized blanks of vinyl plastisol-impregnated glass fiber material are first bound to metal rings with special tape. Operation is called "passe-partouting"



Photos courtesy Bradley Mfg. Co.

Electronic sealing on cone-type shade. After material is positioned on lower electrode bar, top electrode is lowered and power applied

Rectangular four-section shade requires four seaming steps. In Bradley method, metal rims are attached to shades after seams are heat-sealed

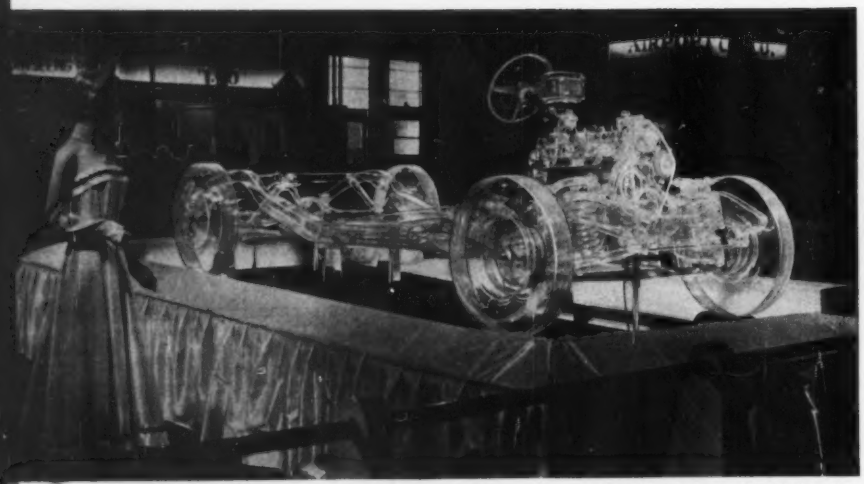
tion. This company uses a vinyl plastisol-impregnated glass fiber material made by Irvington Varnish & Insulator Co. and is said to have been the first firm to produce glass fiber shades for the chain store field. The material, supplied in roll form, is first die cut to blank size and shape by means of a steel rule die and press. The blanks are then bound to the metal top and bottom rings with a tape similar to adhesive tape in an operation known as "passe-partouting."

Electronic seaming is the next operation. Inasmuch as the shade material is thermoplastic, the binding of the seam is performed on high frequency sealing equipment, in a manner similar to that used by Bradley. After completion of the seam, the adhesive binding which secures the material to the top and bottom rings is covered with a decorative braid, completing the shade. The decorative braid, which carries a resin adhesive, is drawn from a roll and passes over a moistened roller before being applied to the shade.

Photos courtesy Paterson Shade Co.

After metal rims have been attached, Paterson's glass fiber shades are electronically sealed. Resultant joint is inconspicuous and strong

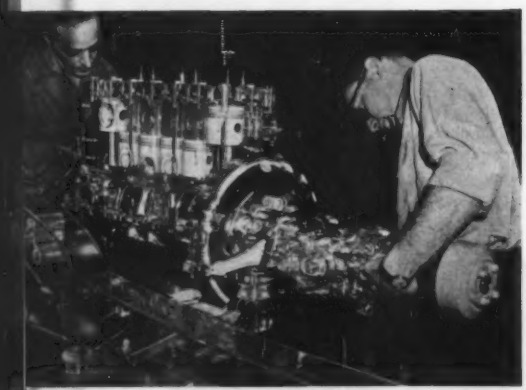
In final operation on Paterson shade, decorative trim is drawn over moistener and applied to shade to cover binding tape



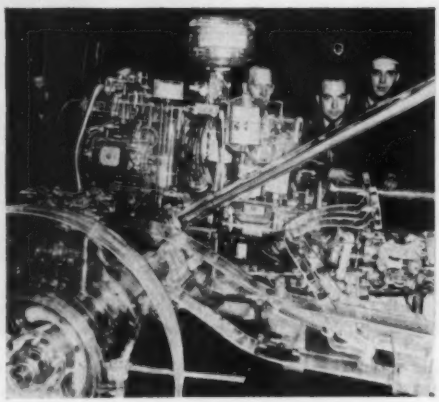
Transparent acrylic full-scale model of Plymouth engine, chassis, and wheels is made up of some 1200 parts — affords complete view of all working parts

Photos this page courtesy Plymouth Motor Corp.

See-Through Chassis



Cylinder block is largest single part of model car. It was machined of solid block of acrylic, 12 by 12 by 24 in., using same precision required for cast iron unit



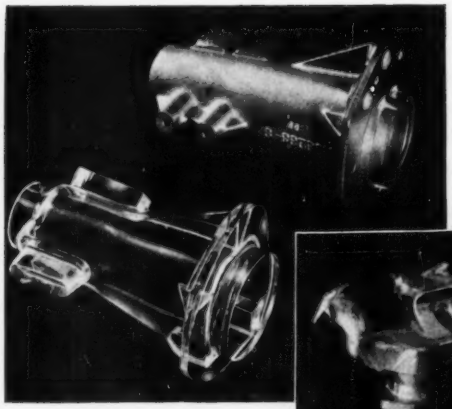
Components of complete power train, made up of standard Plymouth working parts, are colored with a variety of paints which show up under black light. Alternating black and white light enables spectators to follow power flow from combustion chambers to wheels

FOR display purposes, automobile manufacturers have long been using cut-away models of engines and chassis. Such displays were effective, but actually only a portion of the working parts could be seen. Plymouth Motor Corp. has eliminated that disadvantage and built a far more effective display by constructing a transparent acrylic full-scale model of the engine, chassis, and wheels of a Plymouth.

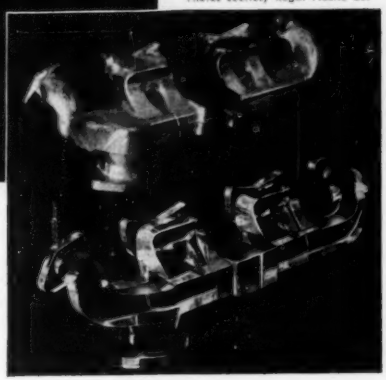
The display is made up of some 1200 Plexiglas parts, each of which is fabricated to resemble as nearly as possible the corresponding metal part of a real Plymouth. Some of the parts were made by tool and die makers of the Plymouth plant in Detroit. Others were made by Regal Plastic Co., Kansas City, Mo., Cadillac Plastic Co., Detroit, and other custom fabricators.

In addition to the plastic parts, the display contains a complete power train (pistons, connecting rods, crankshaft, flywheel, clutch, transmission, differential, and axle shafts) made of standard working parts taken from the Plymouth assembly line. All of these parts are visible through the clear acrylic parts, and are painted in various colors with a type of paint which shows up under black light.

The engine is revolved at 6 rpm.



Photos courtesy Regal Plastic Co.



Although some minor modifications had to be made, acrylic parts are fairly faithful reproduction of originals. In these examples of how two parts were duplicated in plastic, metal parts are at top

by means of a chain drive from a concealed electric motor, while the chassis is lighted alternately with white and black light. The spectators can thus easily follow the flow of power from the combustion chambers to the wheels.

The largest single piece used in the Plymouth model was the cylinder block, which was machined from a solid block of acrylic 12 by 12 by 24 inches. This block was machined to the shape of a regular cast iron cylinder block by kellering and was then drilled, bored, tapped, and assembled with the same precision used in making the iron part.

Many of the lines of the cylinder block had to be altered in order to minimize the magnification and distortion of the working parts caused by the refractive qualities of the acrylic. This was done by reducing or eliminating as many radii and fillets as possible, and by controlling wall thicknesses.

Among the smaller parts which presented problems was the downdraft carburetor which normally consists of several intricate die castings. All these parts were duplicated in Plexiglas and assembled with plastic screws.

All of the standard working parts of a distributor were also duplicated, assembled inside a plastic distributor case, and correctly timed with the engine. Wires attached to the distributor cap led to tiny light bulbs screwed into the lower end of the spark plugs. Firing the plugs was thus simulated by the flashing of the light bulbs.

The Plymouth chassis model was shown for the first time at the Chicago Automobile Show. It can be disassembled for easy shipment, and is now touring to various motor shows and other public gatherings.

Transparent wheel permits view of action of hydraulic brake cylinder. Tire tread is simulated by black light paint

Courtesy Plymouth Motor Corp.

Model Acrylic Engine

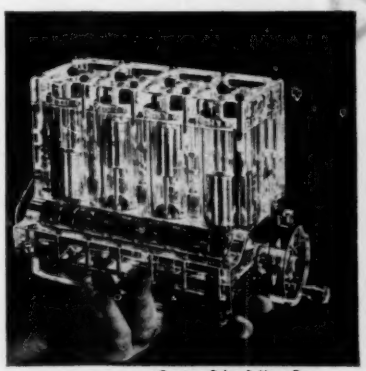
A VISUAL study model of a four-cylinder gasoline engine was recently designed and fabricated of clear acrylic by Philip A. Derham & Assoc., Rosemont, Pa. The model, which is only 8 by 6 by 4½ in., is an unusual example of the close tolerances and visibility of working parts obtainable in industrial models made of acrylic.

The engine block, cylinder head, crankcase, flywheel, and motor mounts of the model were machined from solid blocks of Plexiglas. The timing gear cover was formed from ⅛-in. thick sheet stock.

The model was produced with unusual accuracy and care. The cylinder bores, for example, were machined to a tolerance of −0.0, +0.001 inch. Bores were drilled, then cleaned out with a boring bar operated at slow speed, with kerosene used both as a coolant and cutting oil. Final dimensions were attained by careful control of buffing and polishing. Final polishing of cylinder walls and of other machined surfaces was accomplished by means of white chalk.

Pistons, wrist pins, connecting rods, and valves of the model engine were machined from aluminum. Valve springs were hand wound from steel wire.

The engine has a bore of 1.218 in., a stroke of 1.125 in., a piston displacement of 5.24 cu. in., and a rating of 2.2 horsepower.



Courtesy Rohm & Haas Co

Unusually close tolerances were held in machining parts of acrylic study model of four-cylinder gasoline engine

Reinforced Plastic

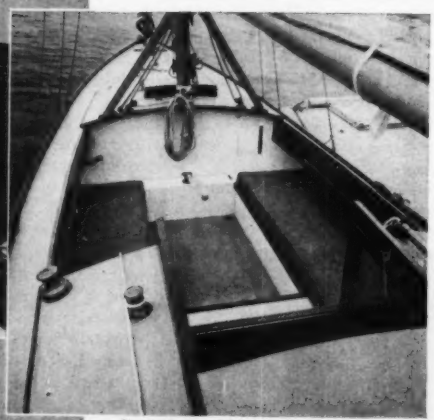
THE biggest reinforced plastic boat ever built, a 42-ft. sailing ketch, has been launched by Anchorage Plastics Corp., Warren, R.I. The largest Fiberglas-plastic boats built previously were two 36-ft. LCVP's built for the Navy by Anchorage in 1948. And last year the company delivered a 24-ft. cargo boat of the same material to the Coast Guard.

The new 42-ft. ketch, Arion, was built to plans of Sidney Herreshoff, noted boat designer, for Commodore Verner Reed of the Ida Lewis Yacht Club, Newport, R.I., a member of the Anchorage Plastics firm. According to the manufacturer, the ketch is far more rugged and

Courtesy *The Providence Sunday Journal*

Sailing ketch 42 ft. long is the largest reinforced-plastic boat ever built. It displaces 10,500 lb., has 8-ft. beam

Deck of the boat is ¾-in. plywood surfaced with polyester-impregnated glass cloth. Blue color is molded-in



Photos above and left courtesy Owens-Corning Fiberglas Corp.

Side view shows trim lines of ketch. The hull is white and, like the deck, has its color molded-in so that it is unaffected by weather or hard wear

Ketch

weather-resistant than a wooden boat of similar type and dimensions, although weighing considerably less.

The Fiberglas-plastic ketch displaces 10,500 lb., of which nearly half is accounted for by its 2½-ton lead keel. A 42-ft. wooden ketch of similar lines would displace about 16,000 pounds.

The Anchorage ketch has a 43-ft. hollow wooden main mast and a 28-ft. mizzenmast. For auxiliary power, there is a 25-hp. Gray engine, which turns a variable-pitch propeller. The craft can sleep four, is fitted with sink, icebox, wash basin, toilet, stove, and storage lockers.

Sale price of the boat was not disclosed, but it was said to be competitive with the average price for a 42-ft. ketch of conventional wooden frame and planked hull construction, taking into account cost of the mold. Anchorage put an estimated 400 man-hours into construction of the Fiberglas-plastic hull, or about one-third the time required to build a comparable wooden hull.

Hull Needs No Ribs

There are no ribs or stiffeners of any kind in the Anchorage ketch. Strength is built into the hull with layers of square-weave Fiberglas cloth, impregnated with polyester resin. The material and fabricating technique make possible precise control of strength and impact resistance throughout the various hull sections. Hull thicknesses, ranging from ¼ to 1 in., are built up with from 10 to 21 plies of Fiberglas cloth. In a few areas, Fiberglas mat supplements the cloth reinforcement for additional strength.

The deck of the boat is ¾-in. plywood, with a topside single surface layer of Fiberglas cloth, coated with polyester resin. Cabin tops and cockpit are similarly surfaced. The deck of the ketch is blue, the hull, white. In each case, pigmentation is throughout the plastic, and a minimum of painting will be required during the boat's life. Both the Fiberglas-reinforced plastic hull and deck are impervious to damaging effects caused by fresh or salt water, sunlight, worms, termites, barnacles, and rot.

Photos this page courtesy *The Providence Sunday Journal*

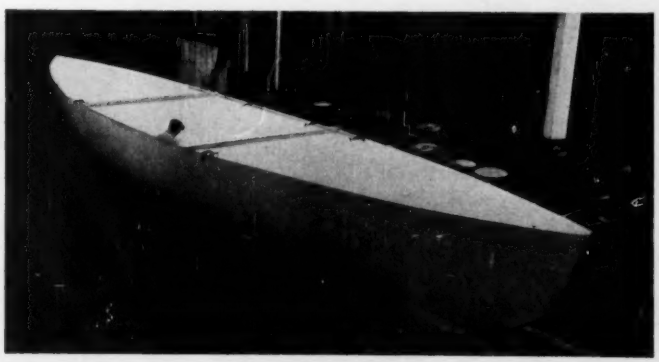
After applying parting agent to mold surface, layers of square-weave glass-fiber cloth are layed up in thickness of ¼ to 1 in. and impregnated with catalyzed polyester resin

Anchorage produced the hull for the 42-ft. ketch by progressive laminating in a female mold made of plywood and plaster. A parting agent was applied to mold surfaces, and Fiberglas cloth was cut to proper sizes and shapes. The hull was then built up by successively laying Fiberglas cloth in various mold sections and spraying in catalyzed resin to impregnate the material. The catalyst made the resin harden at room temperature, and the hull was then lifted from the mold. A bronze fitting in the bow was molded-in, as was the rudder port.

Since it was founded in 1948, Anchorage Plastics has built approximately 500 Fiberglas-reinforced plastic boats. Its main activity is in sailing dinghies, inboards, and rowboats, in the 9- to 16-ft. range.

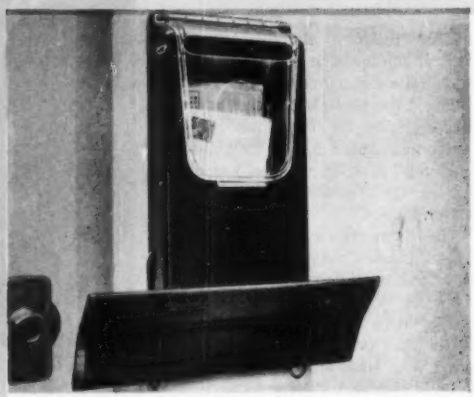
Anchorage is currently doing research development work, centering around use of Fiberglas-reinforced plastics, for several branches of the armed forces. Although built as a pleasure boat, the ketch is a significant development to the armed forces as well.

When resin hardens, reinforced-plastic hull is lifted from mold. Cross pieces are not required to keep shape. Bronze fitting in bow and the rudder port are molded-in



PLASTICS

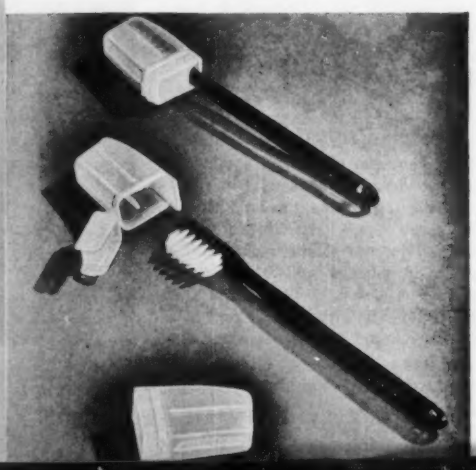
A motorist can check the level and condition of his motor and transmission oil while driving with the Oil-Eye, a compact device housed in Tenite II cellulose acetate butyrate. The device mounts on the dashboard and is connected to the crank case and automatic transmission with hose lines. It operates on vacuum power supplied by the windshield wiper of the car. When the button marked C is pressed, an oil sample is drawn from the crankcase and a light goes on behind the butyrate window. The gage fills if the oil is at the proper level. The T button checks the transmission oil in the left half of the window. Made by Oil-Eye Corp. of America, 51 Walnut St., Winona, Minn.



Durable, attractive mail box is molded of styrene in three pieces. The back of the box is black, the front bronze color, and the lid clear. Slots for a name tab are molded-in to the lid. A metal magazine holder attaches to the bottom of the box, which can be mounted on the door or wall with four screws. The box is 11 by 5½ by 2 inches. It is made by Linehan & Co., 3232 Grand Ave., Dallas, Tex.

Combination insulated picnic cooler and ice bucket has exterior covering of Lumite woven saran fabric in a red, black, and yellow tartan. The cooler, called the Skyelander, is 14 in. high, and 11¾ in. in diameter. It can be used to carry hot or cold food and drinks on a picnic, or as an ice bucket. It will hold nearly 300 ice cubes, which will remain whole for 18 to 24 hours. Made by Hamilton Metal Products Co., 855 Sixth Ave., New York, N.Y.

The ultimate in compactness is achieved by a toothbrush case which protects only the part of the brush which actually needs protection, the bristles. The light-weight case is molded of polyethylene in one piece with the case proper and the lid connected by a runner which serves as a hinge. Molded by Shaw Insulator Co., 160 Coit St., Irvington, N.J., for Simmons Kit Co., 105 W. 40th St., New York, N.Y.



PRODUCTS

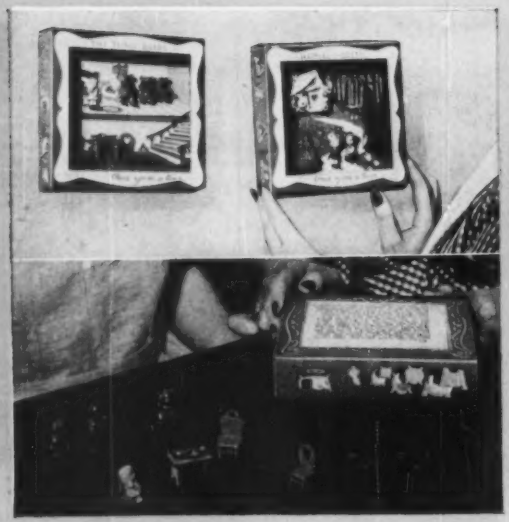
Stainproof studio couch cover which will take hard wear is made of Sealtuft stitchless quilted vinyl and has a skirt made of 7-gage Vinylite, the same material which is used for the top layer of the Sealtuft. The cover can be wiped clean with a damp cloth, requires neither laundering nor ironing. Made in 7 colors for 2- or 3-cushion couches by Vatco Mfg. Co., Inc., 109 Brookline Ave., Boston

Heavy duty mixing bowl is molded of Plaskon urea, has a thick wall section which makes it sturdy enough to take hard use. Its smooth surface is easy to clean and resists scratches, burns, and food acids. Molded-in ridges make the bowl easy to grip. It can be used as a serving bowl or refrigerator bowl as well as a mixing bowl. The bowl is molded in various bright colors by Glenn S. Woolley & Co., 56 Boultbee Ave., Toronto, Ont.

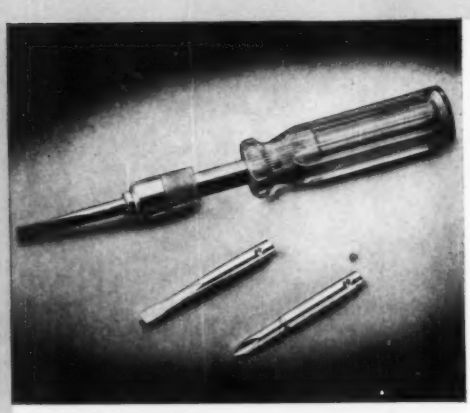
Miniature bouquet of flowers is cast in a piece of clear Lucite acrylic to make an unusual pendant. Fish flies, sea horses, and sea life designs are also cast into pendants in the same manner. Each pendant has a gold filled or sterling chain and comes in a satin pad gift box. The pendant, 1½ in. in diameter and ¼ in. thick, is made by Plastic Developments, Inc., Kilby St., Attleboro, Mass.

Toy car is an exact scale model of the Henry J, Kaiser-Frazer's new low-priced car. The model, scaled 1 to 25, is molded of Hercocel A cellulose acetate in colors to match the paint jobs on real Henry J cars. Molded by U.S. Plastics Corp., 2835 W. Irving Pk. Rd., Chicago, Ill., for Banthrico Industries, Inc., 17 N. Desplaines St., Chicago

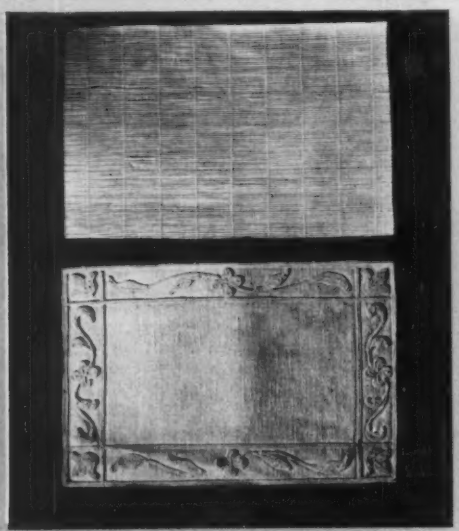
PLASTICS



Children can dramatize their favorite stories with Once Upon A Time toys molded of styrene and elastometric vinyl. There are six sets available, each of which contains the characters and props needed to "stage" a well-known fairy tale. A set in its shadow box can also be used as a wall plaque. Each set has the text of the story printed on the back of the box. Made by Emence Industries, Inc., 200 Fifth Ave., New York, N. Y.



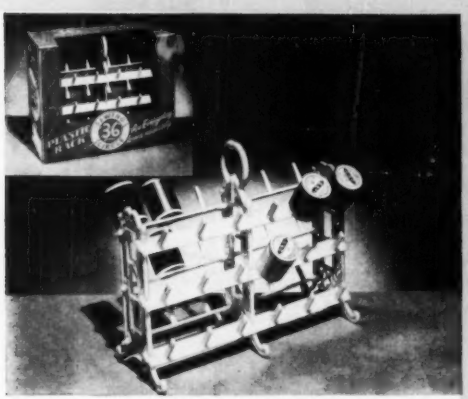
Triple-bit screw driver has two extra blades stored in its hollow Hercocel ethyl cellulose handle. Bits are changed by releasing spring sleeve and inserting removed bit into top of handle. Unbreakable handle molded by Industrial Plastics, Inc., Cleveland, Ohio, for J & S Products Co., Cleveland.



Place mats made of 20-gage vinyl are deeply embossed to give them patterns resembling other materials. One style is embossed to resemble a bamboo mat, another looks like a linen mat with corde trim. The place mats, embossed by the Forrest Process, are made in six different fashion colors by Place Mat Co., 2 West 31st St., New York N.Y.

Double-size coaster molded of polystyrene will hold a beer bottle or a sandwich alongside the glass. It can also be used as a dish for serving nuts or hors d'oeuvres, or as a vanity tray. Molded of dubonnet, chartreuse, green, or grey Styron by Plastic Metal Mfg. Co., 3550 N. Spaulding Ave., Chicago, Ill.

PRODUCTS



Styrene rack keeps 36 spools of thread compactly and neatly arranged. Each spool is visible for easy color selection and accessible instantly. Rack is 7 in. long, 6 in. high, and 3 in. wide, and has a place for storing scissors. Made by Styson Art Products Co., 141 East 47th St., New York, N.Y.

Kitchen reminder molded of Gering cellulose acetate lists the 30 most-used staples in alphabetical order. A polyethylene signal button next to each item can be moved over to indicate whether the item is needed. The reminder can then be folded shut like a memo book and put in the purse or pocket for a trip to market. The acetate reminder is impervious to kitchen oils and greases. Made by Novo-Plas Mfg. Co., Inc., 275 Front St., Brooklyn, N.Y.

Shuffler molded of styrene can handle up to four decks of cards at a time. Cards are put on top of the shuffler in two stacks. Serrated rubber roller geared to hand crank removes cards from bottom of both stacks and mixes them together. Made by Loma Plastics, Inc., 3000 W. Pafford St., Fort Worth, Tex.

Butane gas lighter which operates for months on one refill has rhodium top and colorful case molded of Tenite II cellulose acetate butyrate. The lightweight butyrate case is colorful and has an alligator leather pattern molded-in. It is chip-proof and will withstand rough handling. The case is molded by St. Louis Plastic Molding Co. for Gas Lighters, Inc., both of 4605 Olive St., St. Louis, Mo.

SPECIFY

HOBBED CAVITIES
by MIDLAND

Home of the largest hobbing press in the plastics industry, Midland Die and Engraving is the ONE source qualified, equipped and manned to handle every Hobbed Cavity requirement—from the smallest tooth paste tube caps to radio cabinets, escutcheons and housings up to 80 square inches—nearly three times as large as ordinary hobbing limits. Typical examples of large hobbed cavities by Midland are the portable radio cabinet, radio cover and toy gunstock shown here. Midland engineering, experience and facilities are ready to serve you—ready to deliver *on time* uniform, accurate hobbed cavities at a fraction of machining costs. Specify Hobbed Cavities by Midland on *your* Bill of Materials. Or write for further information and estimates. No obligation.

MIDLAND DIE AND ENGRAVING COMPANY

1800 W. BERENICE AVENUE • CHICAGO 13, ILLINOIS

Makers of Plastic Molds • Die Cast Molds • Engraved Dies • Steel Stamps • Hobbings • Pantograph Engraving

Printed Circuits on Foil-Clad Plastics

by ROBERT L. SWIGGETT†

DURING recent years, interest has been rapidly accelerating in the use of "printed circuits" in the electrical manufacturing industries. As a result, many approaches have been made to the problem of replacing conventional wiring and electronic component parts—such as resistors, capacitors, and inductances—with "printed" wiring and components.

Printing is defined as "the act of reproducing a design upon a surface by any process." It follows, then, that printed circuits can be made by any process which results in the reproduction of a circuit or conductive design upon a surface. This definition covers a lot of ground—and so do the diverse printed circuit production methods which have been proved in practice. The following list covers the four principal methods in use today:

1) Printing of silver ink on ceramics followed by high temperature firing to fuse the silver.

2) Spraying of metal into depressions in a plastic plate.

3) Stamped metal patterns, either bonded to a plastic base or used as a rigid wiring harness.

4) Etching of metal foil-clad plastics.

The present article discusses method No. 4, which appears to be destined for widespread use and which may well bring about a minor revolution in assembly procedures used by the electronics industry. Briefly, the foil etching method, the basic system used by Photocircuits Corp., is as follows: Thin metal foil is laminated to one or both sides of large plastic sheet. An acid resist conforming to the desired conductive pattern is printed on the surface of the metal foil, and the unwanted unprinted portions of the foil are chemically etched away. After washing, cleaning off the resist, and drying, the individual circuits are punched out of the large sheet.

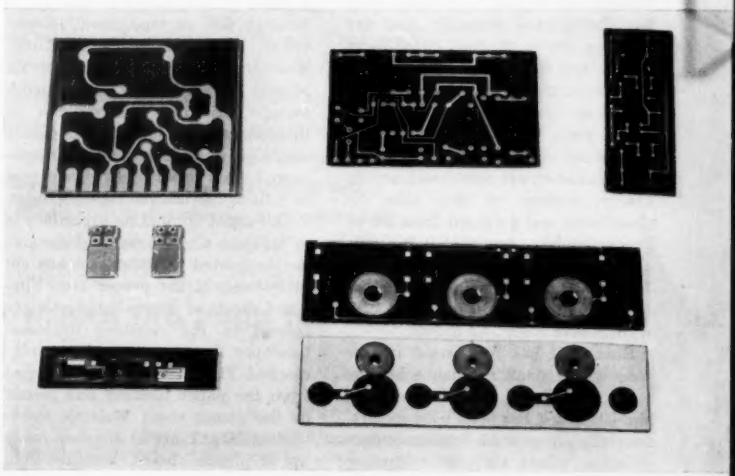
Although this basic idea is not new, little actual progress was made in reducing it to practice until after the end of World War II. Since then, largely spurred on by the work of the Signal Corps Engineering Laboratories, Radio Corporation of America, and Henderson and Spalding in England, the usefulness of the method has received fairly general recognition. At this writing there are a few applications in large volume production and a great many in the design and development stages.

Materials

The first requirement for the production of a printed circuit of the foil-etched type is a sheet of dielectric, usually a plastic, with a metal foil firmly bonded to it. These foil-clad laminates are now manufactured by the leading producers of laminated plastics, with National Vulcanized Fibre Co., Wilmington, Del., and Synthane Corp., Oaks, Pa., leading the field and the others following close behind. In virtually all production to date, $\frac{1}{16}$-in. grade XXXP paper base phenolic laminate is used as the plastic base. This is a logical choice because of the relatively low cost and good electrical properties of this material. XXP phenolic is used in some cases instead of XXXP because of its still lower cost and better punching characteristics, and where its poorer electrical properties are not considered objectionable.

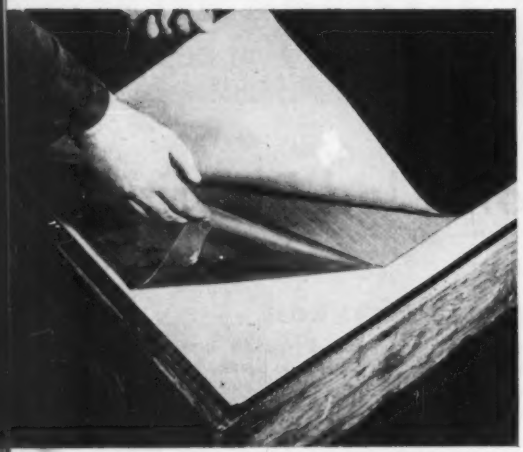
Other laminates have been used as bases experimentally or in pilot

Top: Examples of etched circuits. Middle, left: Two brass heaters on melamine-glass fiber laminate. Bottom: left—experimental T.V. tuner strip; right—T.V. circuit, I.F. strip



* Reg. U. S. Pat. Office

† Exec. Vice President, Photocircuits Corp., Glen Cove, N. Y.



Photos courtesy National Vulcanized Fibre Co.

Fig. 1—Assembling phenolic laminates, bonding film (stripped from paper backing) and copper foil prior to pressing

Fig. 2—Making up sandwich of component layers and polished plates. Sandwiches are put in hydraulic press, cured under heat and pressure

run quantities. Melamine, silicone, and Teflon glass-fiber laminates have been used, in spite of their higher cost, where circuits must withstand temperatures over 300° F. for long periods of time. Polystyrene glass-fiber and polyester laminates have been tested and may prove valuable because of their excellent electrical properties. Experimental work is in progress on laminating foil to glass cloth, impregnated paper, and other thin, flexible supports.

The only metal foil in common use is electrolytic copper sheet manufactured by American Brass Co., New York, N.Y., using a continuous electroplating process. The two thicknesses generally used are the 1-oz. per sq. ft. sheet (0.00135-in. thick), and the 2-oz. per sq. ft. sheet (0.0027-in. thick); ½-, 3-, and 4-oz. sheets are also available.

The main advantages of electrolytic sheet over rolled foil, as far as the laminators are concerned, are its grainy surface on one side, its cleanliness and freedom from oil or grease, and the fact that it is available in wide widths. Rolled copper foil 0.003 in. or less in thickness is not commercially produced in widths over about 12 inches.

Brass foil has been used in one case where small resistance heaters were made by the etching process, and silver foil has been used experimentally in printed wiping-contact switches where abrasion resistance is important. Both of these present more difficult laminating problems since the foils available are rolled only in widths up to about 12 inches. Aluminum foil, on the other hand, is rolled as wide as 52 in., and its use is contemplated in several large-volume etched circuit applications. Generally speaking, special cleaning and etching treatments are needed when using aluminum foil.

Bonding the Foil

Considerable experimentation has been and is now being carried on by the laminators to arrive at the best procedure for bonding the foil to the plastic base. Virtually all of the production to date, however, has used a bonding film or tape manufactured either by Industrial Tape Corp., New Brunswick, N.J., or Minnesota Mining & Mfg. Corp., Minneapolis, Minn. This film, compounded of thermosetting and thermoplastic resins, is cast on a smooth, resin-coated kraft paper support and sold in rolls to the laminating companies.

The usual laminating procedure is as follows: Copper foil and the paper-supported bonding film are cut into sheets of the proper size. Finished sheets of laminated plastic are sanded to the required thickness tolerance if necessary and carefully cleaned. The bonding film is stripped from the paper backing and placed on the plastic sheet. Multiple sandwiches (Fig. 1 and 2) are then made up of plastic sheets, bonding film, copper foil, and polished stainless steel press plates. These sandwiches are inserted in the same hydraulic laminating presses used in the manufacture of the plastic sheets and are cured under heat and pressure. After removal from the press, the foil-clad plastic sheets are usually coated with a strippable plastic film for protection against scratching during the trimming, packing, and shipping operations.

The most important physical properties of the finished laminated product are its peel strength and its resistance to heat. Its loss factor at high frequencies and its resistance to surface leakage under high humidities are the most important electrical properties.

The quality control test adopted by the Signal Corps Engineering Laboratories, Fort Monmouth, N.J., and others for determining peel strength is essentially the determination of the force required to peel off a 1-in. wide strip of foil by pulling at right angles to the laminate. A 2-lb. pull seems to be a good criterion for minimum peel strength by this test.

No firm standards for electrical performance have been set up but some companies, such as General Electric Co., Electronics Park, Syracuse, N.Y., have devised their own procedures for comparison of various materials. Usually a standard pattern consisting of a spiral coil and

(*Continued on p. 105*)

"PLASKON ALKYD cut the cost of our television brackets 50%"

says **Mr. Dorman D. Israel,**
Executive Vice-President
EMERSON RADIO AND PHONOGRAPH CORP.

Television tube bracket molded for Emerson by Plastimold, Inc., Attleboro, Mass.

Meet another enthusiastic champion of Plaskon Alkyd Molding compound!

Mr. Dorman D. Israel, Executive Vice-President of Emerson Radio and Phonograph, like so many other executives of prominent manufacturing concerns, was "sold" by indisputable figures. And the figures, in this case, showed a saving of over 50% in the production cost of television brackets after the switch to Plaskon Alkyd!

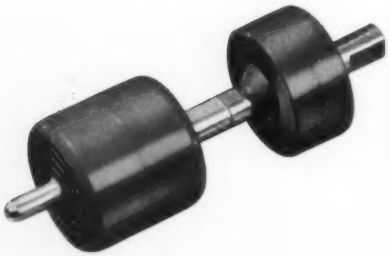
But money-saving is never the whole story where quick-curing Plaskon Alkyd is used in a product. Mr. Israel says, "Plaskon Alkyd was selected for our television sets because of its superior mechanical and electrical properties and, particularly, because of its outstanding electric arc resistance."

now turn the page for ----------

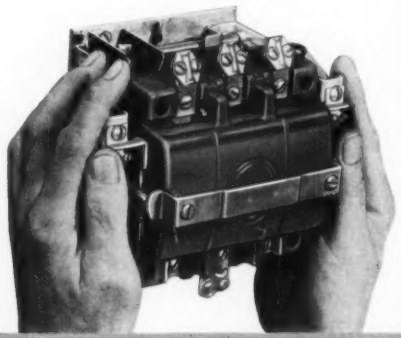
PLASKON®
ALKYD

PLASKON DIVISION • LIBBEY • OWENS • FORD GLASS COMPANY
2121 Sylvan Avenue • Toledo 6, Ohio
In Canada: Canadian Industries, Ltd., Montreal, P. Q.
Branch Offices: Boston, Chicago, New York, Los Angeles, Rochester
Manufacturers of Molding Compounds, Resin Glues, Coating Resins

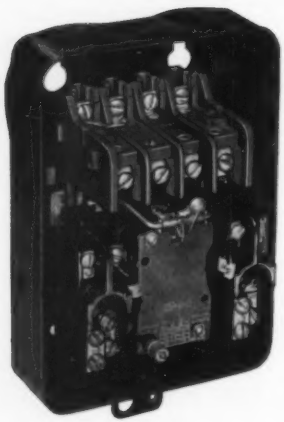
CUTS REJECTS 70%. High voltage capacitors made by Centralab for use in television sets are subjected to a high voltage breakdown test. Rejections were cut 70% when Centralab switched to Plaskon Alkyd.



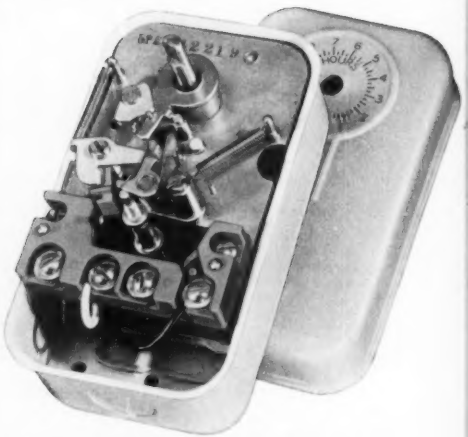
REDUCTION IN SIZE. Exhaustive arc resistance tests faithfully reproducing actual service conditions convinced Arrow, Hart & Hegeman engineers of the unexcelled arc resistance of molded Plaskon Alkyd. This benefit enabled them to redesign and reduce the overall size of their complete line of magnetic starters.



more evidence of savings with PLASKON ALKYD



TIME SAVING 50%; MONEY SAVING 25%. Furnas Electric Company found that the fast molding characteristic of Plaskon Alkyd cut production time 50%. A cost saving of 25% has been realized on the cost of the finished product.



PRODUCTION INCREASED 392%. Switching to Plaskon Alkyd enabled Sangamo Electric Company to produce plastic parts for their time switch nearly 4 times as fast as was possible with a competing material.

HOW

you can produce for less . . .

TO SELL MORE PROFITABLY

Leading producers of electrical and electronic parts have found Plaskon Alkyd a real helper in producing better parts, faster . . . often for less.

Plaskon Alkyd is an ultra high-speed, thermosetting plastic molding compound with excellent electrical properties. It can be molded three to four times faster than conventional thermosetting materials . . . assuring greater production from molding equipment.

Loss from profit-robbing rejects is reduced because Plaskon Alkyd just doesn't require a lot of fussy, kid-glove care to mold. It's much less sensitive to variations in pressure, temperatures and time than other thermosetting materials.

And you can save some real money on tooling costs with Plaskon Alkyd. Simple, less expensive dies are required to mold it. Plaskon Alkyd's high-speed molding characteristics assure greater production from each mold cavity. And fewer cavities are needed to maintain your production schedules.

Plan to use Plaskon Alkyd to produce for less . . . to sell more profitably!

mold it better and faster with

PLASKON®
ALKYD

PLASKON DIVISION • LIBBEY • OWENS • FORD GLASS CO.
2121 Sylvan Avenue • Toledo 6, Ohio
In Canada: Canadian Industries, Ltd., Montreal, P. Q.
Branch Offices: Boston, Chicago, New York, Los Angeles, Rochester
Manufacturers of Molding Compounds, Resin Glues, Coating Resins

TURN THE PAGE FOR NEWS OF ANOTHER PLASKON MOLDING COMPOUND ➔

We're thinking of your future, too, in advertising Plaskon Molding Compounds already in tight supply

Maybe you have been wondering why ads selling the advantages of Plaskon urea and melamine molding compounds continue to appear in spite of the fact that these materials are in short supply.

We believe that this advertising is a good investment. It will pay dividends in the form of future sales . . . not just for us . . . but for our compression molder customers, too.

What's more, we think it's important today that industry be given the facts about materials so they can use them to maximum advantage.

Right now we're doing everything possible to boost the production of Plaskon urea and melamine molding compounds. And one thing you can be sure of . . . to the best of our ability your requirements will be met—and the Molder services which Plaskon offers won't be relaxed.

PLASKON®
MOLDED COLOR

PLASKON DIVISION • LIBBEY • OWENS • FORD GLASS COMPANY
2121 Sylvan Avenue • Toledo 6, Ohio
In Canada: Canadian Industries, Ltd., Montreal, P. Q.
Branch Offices: Boston, Chicago, Los Angeles, New York, Rochester
Manufacturers of Molding Compounds, Resin Glues, Coating Resins

a pair of parallel lines is etched on the surface. When using a new material, the Q[1] of the coil and leakage between the lines is measured at various temperatures and humidities. These results are compared with tests on other laminates which have been found satisfactory in practice.

Printing

The first step in the production of the actual printed circuit piece is the preparation (Fig. 3) of a drawing for photographing. The circuit pattern is drawn in black ink on a white background, usually two to six times full size. From this drawing, using first a copying camera and then a step-and-repeat camera, a so-called step-and-repeat negative is made. This consists of the photographic negative of the original drawing, reduced to proper size, repeated on a photographic plate in a precisely regular manner. Just enough space is left between the rows of negatives on the plate to allow for cutting and blanking out the individual circuits. This operation requires specialized camera equipment operated by skilled photographers.

Next step in the process depends on which one of several procedures is to be used for applying the acid resist pattern. The two principal methods are those used by the two old and well established metal etching industries, namely, photoengraving and nameplate etching. In photoengraving, the acid resist is applied by a photographic method. In nameplate etching, an acid resist is formed by printing an ink on the metal surface and treating this ink in a special manner. Various printing systems have been tried, but the most common one is offset printing or metal lithographing.

Although the photoengraving or photo-etch method is somewhat more expensive than metal lithographing, its use is justified in many cases by the finer quality and greater precision obtainable. As an example, the inductances used in the Halicrafters printed circuit television tuner and the Hoffman Radio Corp. Silver Circle Tuner are produced by photo-etching.

In this method, the large sheets of copper-clad plastic are cut into smaller size sheets normally about 18 by 23 in. for convenient handling. The protective plastic coating is stripped off and the sheets are thoroughly degreased and cleaned. They must be clean enough so that the copper surface will retain an unbroken water film when wet. After cleaning and rinsing with cold water, a light-sensitive "cold top" enamel such as Chemco Glascote Enamel or other light-sensitive coating is flowed (Fig. 4) over the copper surface. To spread this coating uniformly and to dry it, the plate is placed in a machine (Fig. 5) known as a "whirler," which contains electric heating elements. Here the plate is revolved at 100 to 150 rpm. to spin off excess enamel and produce a thin, even coating which dries after about 2 to 3 min. of whirling. The coating is sensitive to strong actinic light such as that from a carbon arc, but it may be handled in normal room lighting during processing without being affected.

The step-and-repeat negative is now used to make a contact print on the coated sheet. The negative is placed over the sensitized sheet in a vacuum printing frame (Fig. 6). After the air is exhausted from the frame, which presses the negative tightly against the sheet, a 3- to 4-min. exposure is made using a carbon arc lamp placed about 36 in. away from the printing frame (Fig. 7).

After printing, the sheet is immersed in a tank of dyed alcohol developing solution such as Chemco Glascote Developer. After about 1 min. the coating dissolves away from the areas of the plate which were under the opaque portions of the negative and hence were not exposed to the arc light. Although the enamel areas which were exposed to the light are insoluble in the developer, they do absorb the purple dye. Thus, when the sheet is removed from the developer (Fig. 8) and washed off with cold water (Fig. 9) the acid-resisting pattern is plainly visible and may be inspected. After drying, the sheet is prepared for etching.

With machines and methods of a proprietary nature, the system can be geared to the high production rates and low production costs required for printed circuit manufacture without sacrificing quality. Fine line work with lines 0.005-in. wide and 0.005-in. spacing between lines

[1] Ratio of reactance to resistance for a coil; a measure of its quality or ability to produce resonance effect.

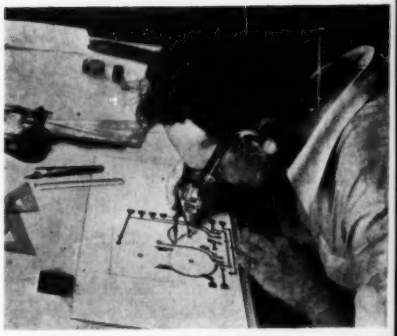


Fig. 3—Prior to photographing, circuit design is drawn several times desired size in black ink on white background

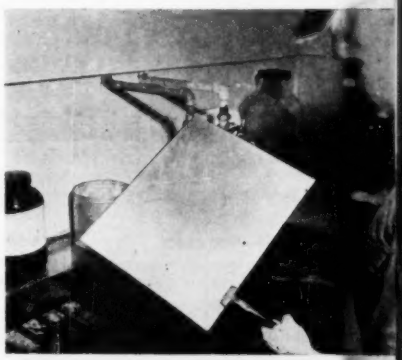
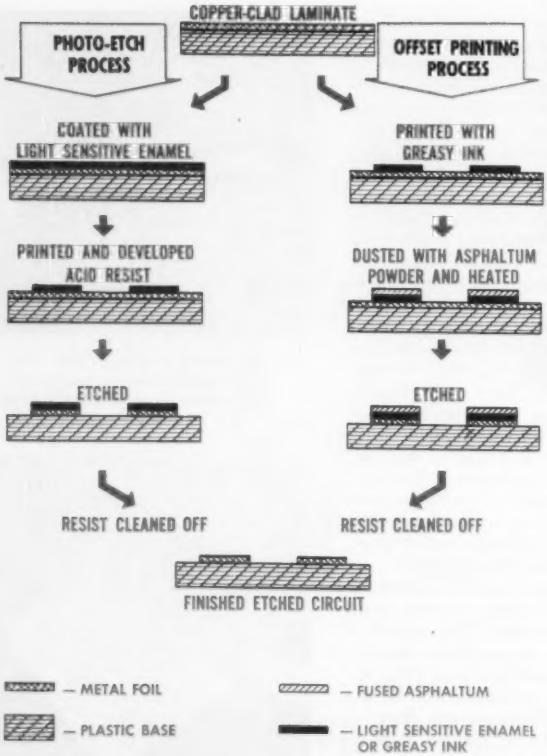


Fig. 4—Light-sensitive enamel is flowed over copper in photo-etching method

Fig. 5—Whirling spreads out enamel, spins off excess, and speeds drying



Sketch 1—Steps in production of printed circuits by the photo-etching and photo-offset methods are shown schematically in related form

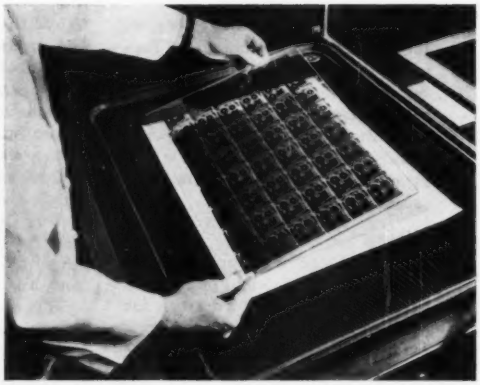


Fig. 6—Placing the step-and-repeat negative in position over coated copper-clad sheet in a vacuum printing frame

can be done on a production basis.

Where there is less emphasis on fine detail, the offset printing method may be employed. Using the step-and-repeat negative, an offset printing plate is made by conventional methods. The patterns are printed on the cleaned copper on an offset printing press, usually a flat bed press especially adapted for printing rigid sheets. The ink used should have as good acid resisting properties as possible.

Unfortunately, if the offset ink is compounded in such a way that when it drys it is a completely dependable acid resist, it is difficult to remove after etching. If the ink is compounded so that it is easily removable after etching, it is not as reliable a resist.

This problem and the problem of small pinholes in the ink deposit can be solved by powdering the ink with asphaltum after printing. This practice is universal in metal etching. After the printed sheet comes off the press, it is covered with asphalt powder. By blowing or vacuuming, the excess powder is removed, leaving a layer of asphaltum on the wet ink. The sheet is then passed through a small oven where the surface temperature is raised to 250 to 275° F. The heat fuses the asphaltum and makes the printed pattern completely acid resistant and ready for etching. Both ink and asphaltum are easily removed with solvents after etching. Other successful approaches have been made to this problem but they are proprietary processes.

The steps in production of printed circuits by photo-etching and by offset are shown schematically in related form in Sketch 1.

Etching

The etching chemicals vary with the foil. For copper and brass, 38 to 40° Baumé ferric chloride solution; for aluminum, hydrochloric acid; for silver, 30% nitric acid. These solutions should be used at 85 to 95° F.

Etching time will depend on the etching machinery used. In paddle-type etchers (Fig. 10), cup-shaped paddles on a rotating shaft pick up the etching solution and fling it against the surface to be etched in a fine spray. Etching is fairly rapid. Copper foil 0.00135-in. thick will be etched through in about 2 minutes. The number of plates which can be etched at one time in a paddle-type etcher is limited.

Tanks are more practical for mass production. The etching solution is placed in a suitable tank and agitation is provided, usually by compressed air jets. The sheets to be etched are either racked or hung in the tank or carried through the tank by a conveyor. Etching time for copper foil in this sort of equipment will vary from 10 to 20 minutes.

In any type of printed circuit etching where quality and consistency are important, a careful control over solution concentration, temperature and degree of exhaustion must be maintained. Timing is important to prevent over-etching and excessive undercutting of the resist.

Fabricating

In general, foil-clad plastics may be fabricated with the same machinery and methods used for sheets without the foil. Shearing and sawing offer no complications. Special care should be taken in the design of progressive piercing and blanking dies so that the stripper plate will

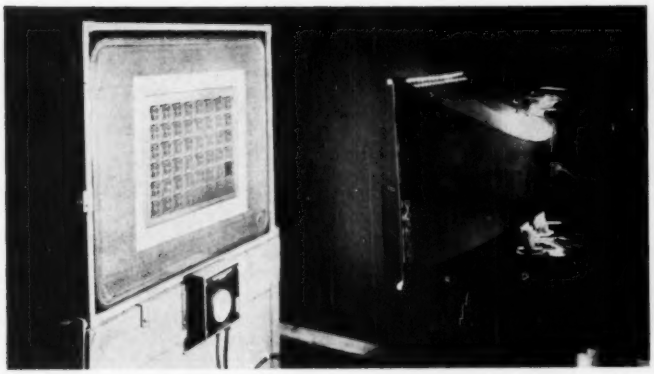


Fig. 7—Air exhausted from frame holds negative in close contact with enamel-coated copper-clad plate. Circuit is "printed" by a 3- to 4-min. exposure using carbon arc lamp

prevent any lifting of the foil when the punches are withdrawn from the piece. Drills should be sharpened with a negative rake similar to that used when drilling aluminum. When so ground, they will not catch the foil and lift it away from the plastic if holes are to be drilled through a narrow line of metal or at the termination of a line.

Fast punching in register with the etched pattern is really the only unusual and sometimes difficult production problem to be met. No general solution exists, however, since each printed circuit is of a different size and shape and the method of handling will depend on the type of tools required, the length of the strips, and other factors.

Ease of fabrication is the greatest advantage of the etched foil printed circuit system over the silver ink and ceramic system.

Assembly

Methods of assembly of printed circuits into finished electronic or electrical devices are as varied as the applications. The most obvious is simply punching or drilling holes through the conductor and the plastic, inserting the leads of standard components into the holes, and hand soldering the leads to the conductors. Complicated circuitry is normally laid out on both sides of the piece to provide for crossovers. Connections between conductors on opposite sides may be made by component leads, tinned eyelets, rivets, pins, or simply short lengths of wire. Repairs can easily be made in the circuits. Components can be unsoldered and resoldered several times before foil tends to lift from base.

Dip soldering shows great promise as an assembly technique for smaller units. All of the circuitry is placed on one side of the plastic piece. Holes about 0.040 to 0.045 in. in diameter are punched or drilled to take the leads of resistors, capacitors, subminiature tubes, etc. All of the components are placed in position on the opposite side of the piece from the etched pattern, with their tinned leads inserted through the holes. Usually the conductors are fluxed prior to this operation with a non-corrosive rosin-type flux. All the necessary connections are then made between the components and the conductors by a single short dip in a molten solder bath (Fig. 11). After dipping, excess lengths of the protruding leads are trimmed off.

For insurance against bridging of the solder from one conductor to another, a spacing of at least 0.030-in. should be left between conductors. If any portions of the printed circuit, such as an inductance coil, are to be left free from solder, they must be coated with a lacquer or masked in some other way before dip soldering.

Another approach to dip soldering may be used for chassis larger than about 6 by 6 in., where warpage becomes a problem when one side of the plastic itself is dipped into the solder bath, or where circuitry on two sides is needed. Tinned hollow pins similar to the pins in a standard large octyl base tube are riveted

Fig. 8—Removing printed sheet from vat containing dyed developing solution

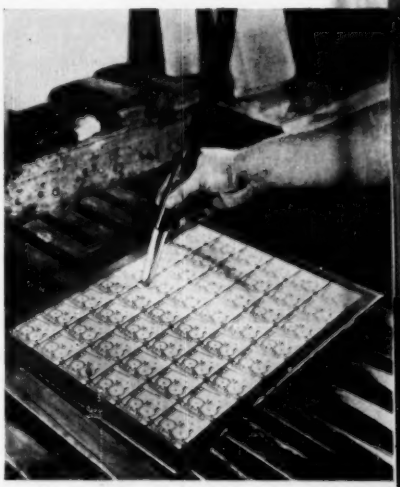


Fig. 9—Washing off developed sheet. Acid-resisting pattern is clearly seen

into place in the tinned circuit pattern at every point where a component lead must be connected or where a connection must be made between conductors on opposite sides. The components are placed on

(*Continued on p. 110*)

BEETLE Plastic is ideal for products and parts made for the "most used" room in the house—the kitchen. Here are *a dozen* good reasons why: 1—BEETLE Plastic is resistant to wear, breakage, abrasion; has nothing to wear off. 2—It is light, yet strong. 3—Won't soften, warp, get hot. 4—Chemically inert, it won't be hurt by common solvents or grease and it resists food acids. 5—Easy to clean and keep clean. 6—In white its sanitary appearance matches other kitchen equipment. 7—Odorless, tasteless. 8—Good insulating properties. 9—Smooth-textured, lustrous. 10—Available in wide range of beautiful, permanent colors. 11—Has easy moldability. 12—It's adaptable to mass production. Enough said? Let's talk about *your* product and fast-cure, low-cost BEETLE.

AMERICAN Cyanamid COMPANY
PLASTICS DEPARTMENT
32 ROCKFELLER PLAZA, NEW YORK 20, N. Y.

In Canada: NORTH AMERICAN CYANAMID LIMITED, Royal Bank Building, Toronto, Ontario, Canada.

Cyanamid Looks At PLASTICS TODAY . . .

Good Will Depends on Little Things

A TOOTH PASTE tube cap, a button, or other "expendable" item—representing only a fraction of a product's cost—can play a vital role in forming the public's opinion of a manufacturer and his products. Bright colors and unique design can stop the shopper. But, if the tube cap cracks or reacts unfavorably with the contents . . . if a button fades or melts over a costly gown . . . good will quickly turns to ill will.

An interesting example of how a very small investment paid off handsomely is the crown-shaped tire valve cap molded by Formold Plastics for Standard Oil of Indiana. These inexpensive replicas of the company's Red Crown symbol are used as "give-aways" by Standard Oil dealers, and have proved very effective in building customer good-will.

When the idea was still embryonic, Standard Oil realized that the reputation of the company would be riding on every tire equipped with a tiny red crown. Even if a valve cap has no effect on the quality of gasoline, customers are still going to be unhappy if the valve doesn't work properly . . . if the threads strip, if it fades, cracks or loses its shape.

To be sure they obtained favorable reaction, the oil company and the molder conducted extensive materials tests. The choice was BEETLE, Cyanamid's urea-formaldehyde molding compound. BEETLE's unique properties—dimensional stability, hard, durable surface, resistance to heat, wear and abrasion, (not to mention resistance to gas and oil)—plus the ingenuity of an experienced molder, resulted in an inexpensive promotional item that is as utilitarian as it is arresting.

Other manufacturers who must stake their reputations on such "expendable" items are turning to BEETLE more and more frequently. Plastics molders have turned BEETLE's properties into closures for jars, tubes, cans, bottles and other containers that are not only more efficient in their functional tasks, but are sales builders as well. The unlimited range of colors and shades, smooth, pleasant-to-touch texture, resistance to chemicals, alcohol and essential oils, and the infinite variety of intricate shapes it can assume, have made BEETLE one of the most popular closure materials. And these same properties have enabled BEETLE buttons to keep their good looks despite the onslaughts of hot irons, strong bleaches, harsh soaps and cleaning fluids.

In the hands of a good thermosetting plastics molder, there's almost no limit to BEETLE's possibilities (take a good look at the items on the opposite page). Their experience, facilities and ingenuity are opening new horizons for plastic products every day.

These men are available . . . so is BEETLE, in reasonable quantities. Why not talk over your problem with the nearest molder today?

Our publication, Plastics Newsfront, is filled with informative articles on BEETLE and other Cyanamid plastics. If you'd like to start receiving it—or if you want the names of molders near you . . . let us know.

Schick Electric Razor housing molded by Shaw Insulator Co.
Zenith Radio housing molded by Breyer Molding Co. and Chicago Molded Products Corp.
Sunkist De Luxe Juicit molded by Breyer Molding Co.
your product
Gilbert Safe T Plug and Outlets molded by Gilbert Mfg. Co. Inc.

switch *on* beauty and durability
switch *off* electrical hazards
switch *to* BEETLE® molding compound

Thanks to BEETLE's resistance to heat, food acids, abrasion and dirt, its molded-in color and dimensional stability, products look better and last longer. For example...Schick electric razor housings have been molded of thermosetting BEETLE for 20 years.

BEETLE's superior dielectric strength, arc resistance and other properties minimize shorts and other hazards . . . help products meet Underwriters Laboratories' standards.

BEETLE is also relatively available NOW! Why not ask us to help?

We may be able to help you meet military specifications where plastics and resins are concerned. What's your problem?

AMERICAN *Cyanamid* COMPANY

PLASTICS DEPARTMENT

32 ROCKEFELLER PLAZA, NEW YORK 20, N. Y.

In Canada: North American Cyanamid Limited, Royal Bank Building, Toronto, Ontario, Canada

Fig. 10—Sheet printed with enamel resist is placed in a paddle-type etcher, and solution is flung against surface

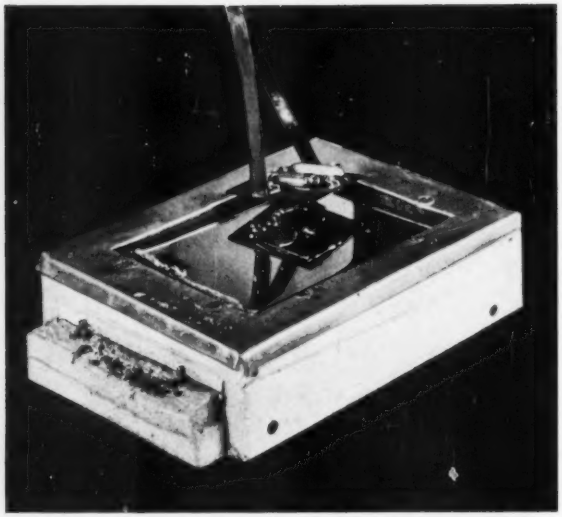


Fig. 11—Removing an assembled amplifier from a dip soldering bath where all necessary connections between components and conductors have been made

the side opposite to the side from which the pins protrude, and their leads are inserted into the pins. All connections are made at once by dipping the pins into a molten solder bath. Good connection between the pins and the conductors is assured because the heat from the solder bath fuses the tinned pins to the tinned conductors.

Much work has yet to be done in developing various types of hardware, such as tube sockets, which are especially designed for printed circuits. However, good results are obtained by using standard hardware as is or by modifying it slightly. Standard wafer tube sockets, for example, can be adapted for easy solder assembly into the printed conductor pattern, and subminiature tubes can be soldered directly into the circuit or used with a subminiature socket.

After units have been assembled it is advisable to coat them with a moisture- and fungus-resistant lacquer or varnish either by spray or by dipping. Potting the completed circuit is another procedure often followed.

As electronic devices become more complex, the trend has been toward designing larger pieces of apparatus as composites made up of small sub-assemblies, each of which is easily removable for replacement or repair. Printed circuits fit into this program admirably, particularly because of their low cost, which makes it economically feasible for the sub-assemblies to be thrown away rather than repaired when they become defective.

Properties of Circuits

The electrical properties of the printed circuits depend upon the base plastic, foil, and bonding agent. A body of knowledge concerning the influence of various materials on electrical properties, such as the Q of etched coils or resistance to surface leakage, is slowly being accumulated as circuit designs are developed and tested. But as yet the cut-and-try method is generally used to select the least expensive materials which will adequately fulfill the requirement called for by a given application.

Inductances with fairly good Q may be etched on a XXXP phenolic base. As an example, the Q of coils in an experimental television intermediate-frequency amplifier strip was found to be 130 which is completely acceptable for this application. A good rule of thumb to remember in designing printed inductances is that the inductance of a printed spiral coil will be roughly the same as the inductance of a wound wire coil with the same length, number of turns, and cross section.

The current carrying capacity of printed conductors is surprisingly high because of the large surface area compared to cross section, and also because the base itself carries away a great deal of heat. When a conductor is overloaded, its temperature rises to the point where the greater thermal coefficient of expansion of the copper and the breakdown of the bond due to the heat causes the conductor to buckle and separate from the base.

The currents required to do this to lines of different widths on a typical sample of commercial copper-clad XXXP phenolic at an ambient temperature of 75° F. are given in Table I. These data indicate that in virtually all electronic circuits the practical considerations determining line width will not be current carrying capacity but will be such factors as available area, soldering technique to be used, etc. Conductor width should be as great as feasible to reduce the amount of metal to be etched away and to increase ruggedness.

High temperature resistance for short periods or continuous operation is important in many military electrical or electronic devices. Almost all requirements can be met by choosing the correct plastic.

Phenolics will go as high as 275° F. for continuous operation or up to 400° F. for short periods; melamine-glass laminates will stand temperatures 25 to 50° F. higher than phenolics. Silicone- and Teflon-glass will withstand 400 to 450° F. continuously. The successful bonding of copper to Teflon and the use of silicone adhesives to bond copper to silicone-glass laminates have extended the field of use of etched circuits to include those high temperature applications where formerly only printed circuits on ceramics were acceptable. For example, printed resistors often require curing cycles of 4 hr. at 400° F. or higher, a condition which formerly could be met only by ceramics. Now, however, high temperature resistant plastics and bonds are available for etched circuits, and it is no longer necessary to rely solely on ceramics.

Cost Savings

In the final analysis, printed circuits justify themselves in the majority of cases solely because of the cost savings they make possible. Only in a few cases, such as very complex commutators and switching networks or in such devices as the proximity fuse where extremes of miniaturization are required, can printed circuits do things which cannot be done by other more conventional methods and thereby justify their use on a basis other than cost reduction.

Table I—Overload Currents for Printed Circuits on Copper

Line Width	*Approximate overload current for foil lines*	
	0.00135-in. copper	*0.0027-in. copper*
in.	*amp.*	*amp.*
1/4	23	35
1/8	15	20
1/16	10	15
1/32	5	8
1/64	3	5

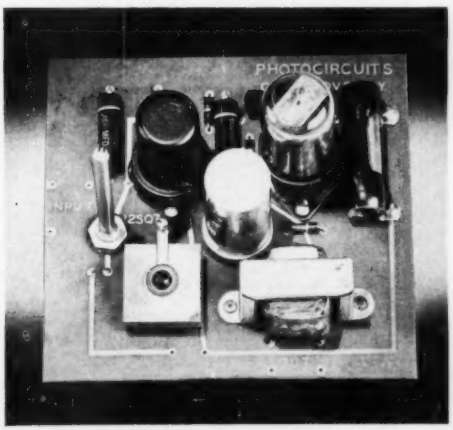
The savings will not be found in material costs. These will be roughly comparable to the costs of the steel chassis, hardware, components, and wire now in use. The great savings are in assembly labor, inspection time, and overhead. Assembly labor is obviously reduced by the automatic or semi-automatic systems such as dip soldering made possible by printed wiring and components. Inspection time is cut because of the excellent reproducibility of printed circuitry and its comparative simplicity. Overhead is lowered because many more units may be produced in a given amount of factory space. Production lines are much shorter.

The Future

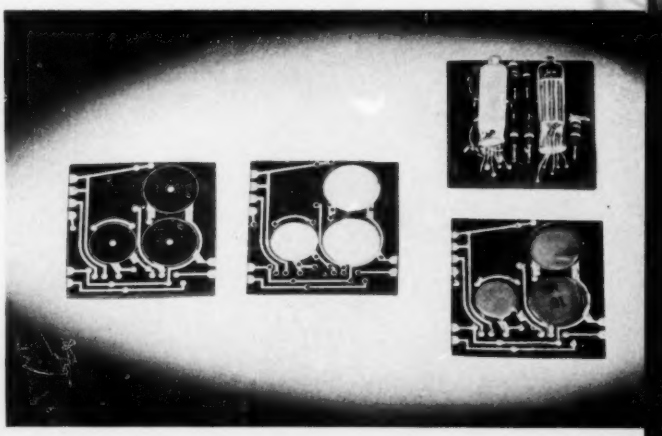
There seems to be little doubt that the future of printed circuitry in general is enormous. Developments to date have barely scratched the surface of possibilities. Dreamers visualize applications ranging from electrically heated wall paper to the Dick Tracy type of wrist radio. But it is the considered opinion of many leading electronics engineers that within the next decade there will be almost a complete revolution in the manufacturing methods used in the electronics industry. This opinion is based on the experimentation of the past 15 years and the development engineering being carried out at a rapidly accelerating pace today.

Manufacture of printed circuits must be carried out in a mass production manner in order to be efficient. Relatively large plants are required, equipped with specialized machinery which can turn out hundreds of thousands of pieces per day at very low cost. This new industry will probably develop to service the electronics industry as a whole in much the same way as production of components is carried out today.

Circuit printed on phenolic chassis: components and filament conductors on top; other conductors on bottom



Assembly steps, two-stage amplifier: left, etched circuit on 1/16-in. phenolic; center, fabricated piece; right, top-bottom views after dip soldering



WHEN NEEDED ...a specialist

There are vast treasures under the sea. They yield their secret to specialists only.

Without the proper specialists, many a fine product, too, would not give up the treasure buried in it. That's why you'll find one of America's most brilliant group of specialists in plastics at Marblette. And, around these men, Marblette has built up over 22 years the *special* equipment specialists must have. Only thus has it become possible to give you the special formulation in each liquid phenolic resin necessary to meet your special production requirements . . . and to meet also the special functional needs of your production and your special marketing problems.

Marblette's liquid phenolic resins are the thermosetting plastics which can be set either by heat or at room temperature. Among other properties, they are weather-proof, solvent-proof, fungi-proof; resistant to abrasion, heat and temperature.

Let Marblette's 22 years' experience help you in solving your liquid phenolic resin needs—in drums or tank car quantities. Our plant and offices are strategically located to serve you promptly anywhere in the United States. Write "Marblette Engineering" to analyze and prepare samples for you of the one phenolic resin best suited to your special needs.

liquid phenolic resins

Casting resins for dies and tools
Heat and acid resistant resins • Bonding resins
Resin foundry core binders • Bristle setting cement
Laminating varnish • Wood coating • Plastic cements
Metal coating • Insulating varnish • Sealing resins

MARBLETTE

37-21 30th St. • Long Island City, N. Y. • ST 4-8100
CHICAGO • LOS ANGELES • TORONTO • HAVANA

Mechanical and Permanence Properties of Laminates†

by DR. GORDON M. KLINE††

THE use of laminated plastics in aircraft has increased markedly during the past few years, especially in accessories and semistructural parts, such as bulkheads, partitions, linings, propellers, wing flaps, and ducts. There has accordingly developed a need for more comprehensive information regarding the mechanical and permanence properties of these materials in order to evaluate their suitability for various aircraft applications and to prepare specifications for satisfactory products. The National Bureau of Standards has conducted investigations, under the sponsorship of the National Advisory Committee for Aeronautics, to provide these data.

The investigations completed to date can be classified into the following specific topics: 1) mechanical properties of laminates at −70°, 77°, and 200° F.[1-3], 2) effect of temperatures up to 700° F. on strength of laminates[4], 3) effect of laboratory and outdoor aging tests on laminates[5,6], and 4) effect of immersion in fuels on laminates[7]. The results

*Reg. U. S. Pat. Office

†Paper presented as part of a Symposium on Plastics at the Massachusetts Institute of Technology, and at a meeting of the Reinforced Plastics Div. of The Society of the Plastics Industry.

††Chief, Organic Plastics Section, National Bureau of Standards.

[1] "Impact Strength and Flexural Properties of Laminated Plastics at High and Low Temperatures," by J. J. Lamb, Isabelle Albrecht, and B. M. Axilrod. N.A.C.A. Technical Note No. 1054 (Aug. 1946).

[2] "Tensile and Compressive Properties of Laminated Plastics at High and Low Temperatures," by J. J. Lamb, Isabelle Boswell, and B. M. Axilrod. N.A.C.A. Technical Note No. 1550 (July 1948).

[3] "Mechanical Properties of Laminated Plastics at −70, 77, and 200° F." by John J. Lamb, Isabelle Albrecht, and B. M. Axilrod. J. Research of the National Bureau of Standards *43*, 257–289 (Sept. 1949).

[4] "Strength of Heat-Resistant Laminates," by B. M. Axilrod and Martha A. Sherman. National Bureau of Standards Report to the National Advisory Committee for Aeronautics and the Air Materiel Command (Oct. 1949).

[5] "Effect of Simulated Service Conditions on Plastics," by W. A. Crouse, D. C. Caudill, and F. W. Reinhart, N.A.C.A. Technical Note No. 1240 (July 1947).

[6] "Effect of Simulated Service Conditions on Plastics During Accelerated and 2-Year Weathering Tests," by W. A. Crouse, D. C. Caudill, and F. W. Reinhart. N.A.C.A. Technical Note No. 1438 (May 1948).

[7] "Effect of Fuel-Immersion on Laminated Plastics," by W. A. Crouse, Margie Carickhoff, and Margaret A. Fisher. National Bureau of Standards Report to the National Advisory Committee for Aeronautics (Jan. 1949).

Table I—Description of Materials

NPS designation	Type of laminate[a]	Density g./cm.³	Thickness, average in.	Manufacturer	Resin: Type	Resin: Content by weight %	Reinforcement: Type	Reinforcement: Thread count Warp	Reinforcement: Thread count Filling	Reinforcement: Number of plies	Reinforcement: Ply arrangement	Molding Conditions: Pressure lb./in.²	Molding Conditions: Temp.[b] ° F.	Molding Conditions: Time of heating min.	Molding Conditions: Time of cooling[b] min.
L1	Low-pressure cotton-fabric phenolic	1.36	0.15	Bakelite	Bakelite—BV-16837	52	Enameled duck 8 oz./yd.²	84	28	9	Cross	250	325	30	..
L2		1.32	.60							35					
V1	Low-pressure Grade C phenolic	1.27	.15	Synthane	Army duck 10.4 oz./yd.²	51		50	40	7	"	180	320	50	..
V2		1.29	.55							26[c]					
W1	High-pressure Grade C phenolic	1.35	.14	"	Bakelite—BV-1112	47	"	50	40	7	"	1800	320	50	..
W2		1.36	.45							25					
Y2	Grade C phenolic	1.34	.53	"	"	48	Cotton fabric	50	40	27	Parallel	1800	340±20	50	20
Z1	Rayon-cotton-fabric phenolic	1.37	.16	Formica	Ironsides Co.—Phenolic 91-L	37 to 40	Fortisan WE-3975 3/1 twill, 12.5 oz./yd.²	Rayon 75	Cotton 12	7 23	Cross	1100	300	20	20
Z2		1.37	.48												
S1	High-strength-paper phenolic	1.42	.12	Consolidated Water Power & Paper	Bakelite—16526	30	High-strength Mitscherlich paper 32.5 lb./ream of 480 sheets 24 by 36 in.	..	..	27/0.060-in. thickness.	"	250	310±10	12	..
S2		1.42	.50											30	..
K1	Grade AA asbestos-fabric phenolic	1.50	.15	Synthane	Bakelite—2427	47	Asbestos fabric 18 oz./yd.²	18	16	5	Parallel	1800	340±20	50	20
K2		1.48	.57							20					
AB1	Glass-fabric unsaturated-polyester	1.82	.13	A. F. Technical Service Command	Plaskon 900	43	Fiberglas ECC-11-112	38	38	45	"	40	180	120	..
													220	120	..
AB2	"	1.86	.49	"	"	43	"	38	38	166	"	40	160	120	..
													180	120	..
													200	120	..
													220	120	..
U2	"	1.78	.60	Plaskon	"	50	"	38	38	160	"	50	122	720	..
													230	240	..

[a] Grade AA and Grade C refer to NEMA designations.

[b] If two or more temperature-time conditions are listed for one laminate, they were applied in succession to cure the laminates.

[c] Warp directions at right angles in the two face plies.

[d] The ⅛-in.-thick sample and the 1/16-in.-thick sample of the Z material used in the impact, flexural, and tensile tests were received at the same time. The ½-in.-thick sample used in the compressive tests was received 10 months later.

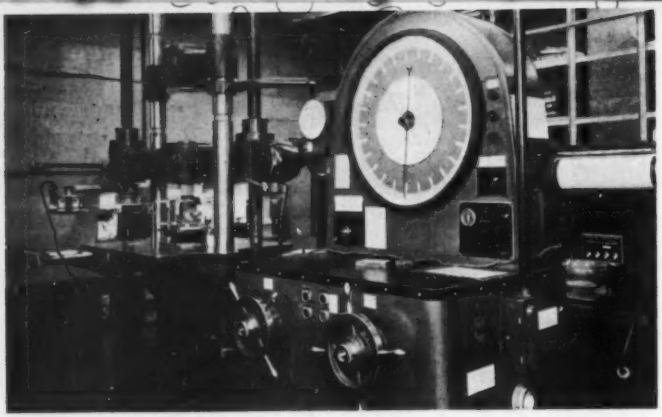


Fig. 1—Hydraulic universal testing machine with electrical-mechanical extensometer and autographic recorder. Flexural jig is shown with specimen in position for testing

Table II—Properties of Laminates at 77°F. and 50% Relative Humidity [a]

Type of laminate	*Density*	*Ply arrangement*	*Impact strength[b] Flatwise*	*Impact strength[b] Edgewise*	*Tensile modulus of elasticity*	*Tensile strength*	*Flexural strength*	*Compressive strength*
	g./cm.³		*ft.-lb./in. of notch*		*10^6 lb./in.²*	*10^3 lb./in.²*	*10^3 lb./in.²*	*10^3 lb./in.²*
Low-pressure cotton-fabric phenolic	1.34	Cross	6.0	3.2	1.0	12	18	22
Low-pressure Grade C phenolic	1.28	"	6.6	3.3	0.8	9	16	19
High-pressure Grade C phenolic (commercial sample)	1.36	"	5.7	2.8	1.0	10	18	20
Grade C phenolic (commercial sample)	1.34	Parallel	5.1	2.7	..	..	21	25
Rayon-cotton-fabric phenolic	1.37	Cross	17.6	6.6	1.9	32	34	25
High-strength-paper phenolic (commercial sample)	1.42	"	4.2	0.8	2.6	30	33	19
Grade AA asbestos-fabric phenolic (commercial sample)	1.50	Parallel	4.6	3.8	1.5	8	16	20
Glass-fabric unsaturated polyester	1.82	"	31.5	9.9	3.0	43	53	42

[a] All strength values are for the lengthwise direction of the sheet. [b] The impact strength, flexural strength, and compressive strength measurements were made on ½-in.-thick material. The tensile tests were made on ⅛-in.-thick material.

Fig. 2—Front view of tensile testing enclosure in place in a hydraulic-type testing machine. The box shown at extreme right is a servicing unit employed to supply hot or cold air to enclosure on testing machine. Selsyn motor, visible to the right of the enclosure, is a link between the tensile strain gage and the stress-strain recorder

and conclusions derived from this work are summarized in this paper.

Strength at —70, 77, 200° F.

The Izod impact strength and the flexural, tensile, and compressive strengths and moduli of elasticity of representative phenolic and polyester laminates were determined at —70°, 77°, and 200° F. The materials tested are described in Table I. The tests were made in insulated enclosures built especially for this purpose (Fig. 1 and 2). Special jigs and fixtures were also built for the flexural and compression tests (Fig. 3 and 4).

The properties of the laminates at 77° F. are shown in Table II. The tensile stress-strain curves at 77° F. of some of the laminates are shown in Fig. 5. The percentage changes in the strength values at —70° and 200° F. are discussed in the following paragraphs; the changes in flexural, tensile, and compressive properties are shown graphically in Fig. 6.

The Izod impact strength-temperature trend of the laminated plastics is different for the various types of reinforcement. The glass-fabric laminates decrease steadily in impact strength with increasing temperature, the value at 200° F. being about 60% of the —70° F. value. The asbestos-fabric, rayon-fabric, and high-strength-paper laminates show little variation in impact strength between —70° and 200° F. The cotton-fabric laminates exhibit increasing impact strength with temperature, roughly doubling their impact strength between —70° and 200° F. The Izod impact strength values for the rayon-fabric and the glass-fabric laminates are much greater than for the other materials.

An increase in flexural strength and flexural modulus of elasticity occurs for all the samples at low temperature, and at high temperature a decrease occurs for all the samples except the asbestos-fabric laminate, which shows no change. The high-strength-paper and glass-fabric laminates have the highest flexural strength and flexural modulus of elasticity. When the samples are compared on the basis of specific strength values, the paper and rayon-fabric laminates are superior to the others. The low-pressure Grade C phenolic laminate compares favorably in flexural strength properties with the high-pressure

growing improvement

Crops on modern irrigation farms receive a steady water supply through improved weather-resistant tubes of extruded Tenite. These durable tubes are easy to handle—lightweight and shatterproof, they can be readily distributed along the irrigation ditch from a moving truck. They are efficient in operation—Tenite's smooth, corrosion-free surface affords a maximum uniform flow of water from ditch to furrow; transparency permits quick location of possible obstructions. They are economical to maintain—an ultraviolet inhibitor in the Tenite formula, plus a newly added red dye, insures long service life.

The good weathering properties and extreme toughness of Tenite find practical application, also, in such related products as oil field tubing and gas service piping. Available in a wide range of flows and in thousands of chipproof colors, Tenite can be extruded or molded for a multitude of uses both outdoors and in.

For further information about Tenite, write Tennessee Eastman Company, Division of Eastman Kodak Company, Kingsport, Tennessee.

TENITE

an *Eastman* plastic

• *Irrigation tubes manufactured by Nebraska Plastics, Inc., Cozad, Nebraska.*

• **Information regarding Tenite is also obtainable through representatives located in Chicago, Cleveland, Dayton, Detroit, Leominster (Mass.), Los Angeles, New York, Portland (Ore.), Rochester (N. Y.), St. Louis, San Francisco, and Seattle; and elsewhere throughout the world from Eastman Kodak Company affiliates and distributors.**

laminate, made with the same reinforcement, especially when the comparison is made in terms of specific strength properties.

The tensile and compressive strengths and moduli of elasticity of all laminates increase at low temperature and decrease at high temperature relative to values at 77° F.

For all laminates, except the asbestos-fabric product, the tensile and compressive strengths at 200° F. are approximately half of the corresponding values at −70° F. The changes in the strength values of the asbestos-fabric product are much smaller than those for any other laminate.

For the laminates with reinforcement based on cellulose, the increase in compressive strength at the low temperature is much greater in magnitude than the decrease at the high temperature; the tensile strength variation, however, is less at the low temperature than at the high temperature. The tensile and flexural strengths of these samples exhibit similar temperature changes.

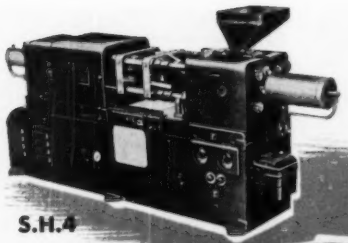
The tensile and compressive moduli of all samples increase more at the low temperature than they decrease at the high temperature. Except for the high-strength-paper laminate, the overall changes are greater for the cellulose than for the mineral type of laminates. The high-strength-paper, asbesto-fabric, and glass-fabric laminates show about

Table III—Description of Materials

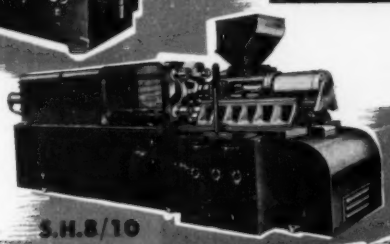
	Sample A	*Sample E*	*Sample F*	*Sample G*	*Sample C*	*Sample B*	*Sample H*	*Sample J*
Laminator of sample	American Cyanamid Co.	Plaskon Div.	Monsanto Chemical Co.	Rohm & Haas Co.	E. I. du Pont de Nemours & Co., Inc.	Dow Corning Corp.	Rohm & Haas Co.	The Formica Co.
Resin used								
Trade name and number	Laminac PDL-7-261, B-11	Plaskon 911-11	Thalid X-528-10AC	Paraplex P-43	BCM monomer, 60%; polymethyl methacrylate HG-4, 40%	DC 804	Redux	Melmac 405
Chemical type	Polyester	Polyester	Unsaturated polyester; vinyl-type monomers	Unsaturated polyester-styrene	Acrylic addition type; thermosetting	Silicone	Phenolic	Melamine-formaldehyde
Catalyst used with resin								
Name or type	Luperco ATC (Note a)	Luperco ATC (Note a)	Luperco ATC (Note a)	Benzoyl peroxide	Residual benzoyl peroxide in polymethyl methacrylate	...	None	None
Amount, %	0.5	4	2	1	...	...	...	...
Liquid added to resin to prepare it for application to fabric								
Name	Styrene	None	None	Styrene	Methyl ethyl ketone	Toluene	None	Water, 95%; butyl alcohol, 5%
Amount, parts								
100 parts of resin	40	...	...	15	135	67	...	67
Resin content (by weight) of finished panel								
Manufacturer's data, %	33±2	31	45	40-45	56	39	40-45	42-47
National Bureau of Standards data, %	35	32	24	42	62	...	44	46
Fabric used								
Identity	Fiberglas 181-A-14	Fiberglas 181-A-14	O.C.C. 181-A-14	Fiberglas 181-38, Finish 114	Fiberglas 181-A-13	Fiberglas 181-A-12	Fiberglas 181-38, Finish 114	Fiberglas ECC-128; sizing pyrolyzed to light brown
Number of plies	12	15	15	12	6	11	12	13
Ply arrangement	Parallel	Parallel	Cross	Cross	Cross	Cross	Cross	Parallel
Treatment prior to application of resin (drying, etc.)	None	In forced-draft oven for 2 hr. at 204° C.	None	None	None	...	None	...
Method of applying resin	Dipping	By hand with broad-blade spatula	Brush	Brush	Continuous dip and squeeze roll	Dipping	Dipping	Dipping
Drying of impregnated fabric	...	...	...	...	Solvent evaporated in forced-draft oven at 43° C.	...	Air dried for 30 min. at room temp., 15-18 min. at 104° C. in forced-draft oven	...
Molding conditions								
Equipment								
Heat	Steam	Steam	Steam	Steam	Steam	Steam	Steam	Steam
Pressure	Hydraulic press	Hydraulic press	Platen press	Hydraulic press	Hydraulic press	Hydraulic press	Hydraulic press	Hydraulic press
Precure	None	None	None	...	None	...	...	None
Temperature, ° C.	...	...	...	104	...	110	145	...
Pressure, lb./in.²	...	...	...	5	...	Atmospheric	15	...
Time, min.	...	...	...	3	...	10	1	...
Cure								
Temperature, ° C.	105, 15 min. 125, 10 min.	100	100-110	145	110	175	145	25 to 124, 20 min. 142 to 147, 20 min.
Pressure, lb./in.²	10	25	15	50	50	900	50	1100
Time of heating under pressure, min.	25	30	15	5	15	75	15	ca. 40 min.
Time of cooling under pressure, min.	None	None	5	None	3	30	None	15
Aftercure	None	None	None	None	None	90° C., 15 hr.[b] 130° C., 4 hr. 160° C., 4 hr. 190° C., 16 hr. 250° C., 4 hr.	None	None
Sample								
Area, in.	12 by 22, 21 by 22	12 by 12	12 by 12	10 by 10	14 by 19, 11 by 12	12 by 12	10 by 10	21 by 36
Thickness, in.	0.11-0.13, 0.11-0.13	0.13-0.14	0.09-0.12	0.13-0.15	0.10-0.13, 0.10-0.13	0.13-0.14	0.13-0.15	0.12-0.13
Number of sheets	1 1	10	4	14	3 2	3	14	1

[a] Luperco ATC consists of 50% benzoyl peroxide and 50% tricresyl phosphate. [b] Mechanical convection oven.

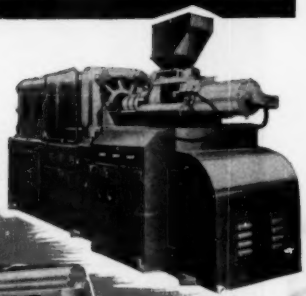
Windsor's
INJECTION MOLDING MACHINES



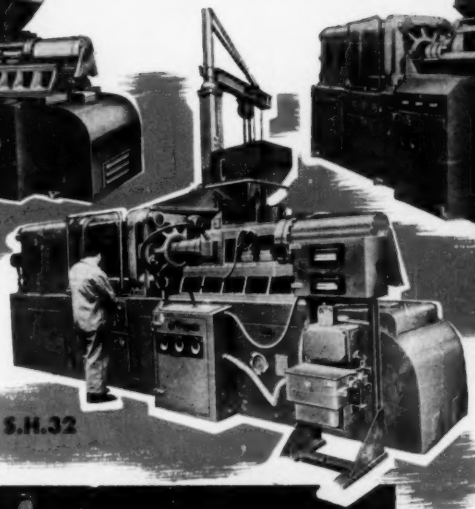
S.H.4



S.H.8/10



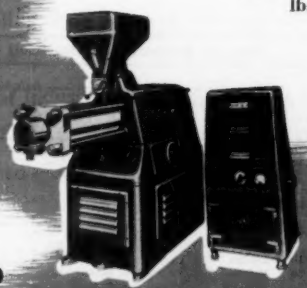
S.H.16/20



S.H.32

Injection moulding machines ranging from .35 oz. to 200 oz. capacity. Those from .35 oz. up to 3 oz. are hand operated and semi-hydraulic. Our S.H.4. oz., S.H.6/8 oz., S.S.8/10 oz., S.H.16/20 oz. and S.H.28/32 oz. are automatic controlled cycle and/or hand operated machines. The U.H.M. 48 oz., 64 oz., 80 oz. and 200 oz. are built under the J-C "Hendry" pre-plasticizing process.

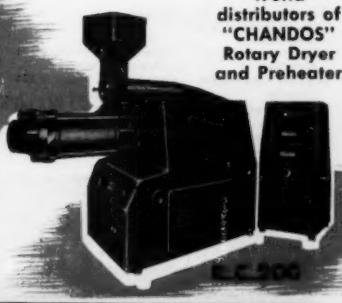
Windsor's
EXTRUSION MACHINES



R.C.100

Our range consists of multi-screw machines built under L.M.P. principles in R.C. 65 lbs., R.C. 100 lbs. and R.C.200 lbs. capacities respectively. The multi-screw extruders being well known for their efficient compounding, mixing and uniform extruding qualities.

World distributors of "CHANDOS" Rotary Dryer and Preheater



R.C.200

SERVING THE WORLD'S PLASTIC INDUSTRY

R. H. WINDSOR LTD.
16 FINSBURY SQ., LONDON, E.C.2
ENGLAND
Phone MONarch 8722 Cables TECHNIMACH LONDON
Grams TECHNIMACH FINSQUARE LONDON

MAKERS OF MOULDS, DIES & ANCILLARY EQUIPMENT

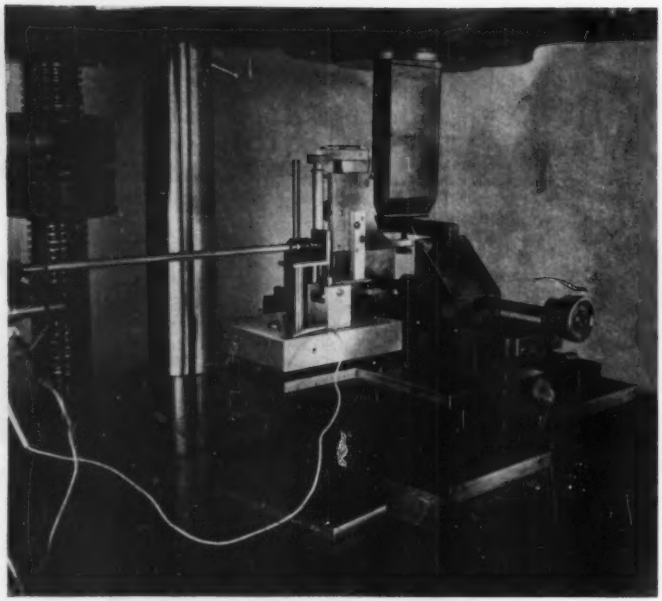


Fig. 3—Flexure test jig with Southwark-Peters recording deflectometer attached

the same overall variation of tensile and compressive moduli with temperature.

The tensile strengths of the high-strength-paper, rayon-fabric, and glass-fabric laminates are about three times greater than those of the cotton-fabric and asbestos-fabric phenolics.

The glass-fabric laminate is outstanding in compressive strength; at 77° F. its strength is 36,000 and 42,000 p.s.i., respectively, in the crosswise and lengthwise directions. The compressive strength of the other laminates is 21,000 p.s.i. within about 10 percent.

The tensile and compressive moduli of elasticity of the glass-fabric and high-strength-paper laminates are greater than for the other materials at all temperatures and are in the range 2,600,000 to 3,300,000 p.s.i.

The flexural properties of plastic

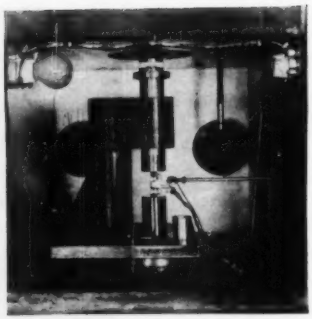


Fig. 4—Interior view of insulated enclosure with specimen in place in compression tool, extensometer attached

Table IV—Relative Heat Resistance of Glass-Fabric Laminates, Based on Flexural Properties

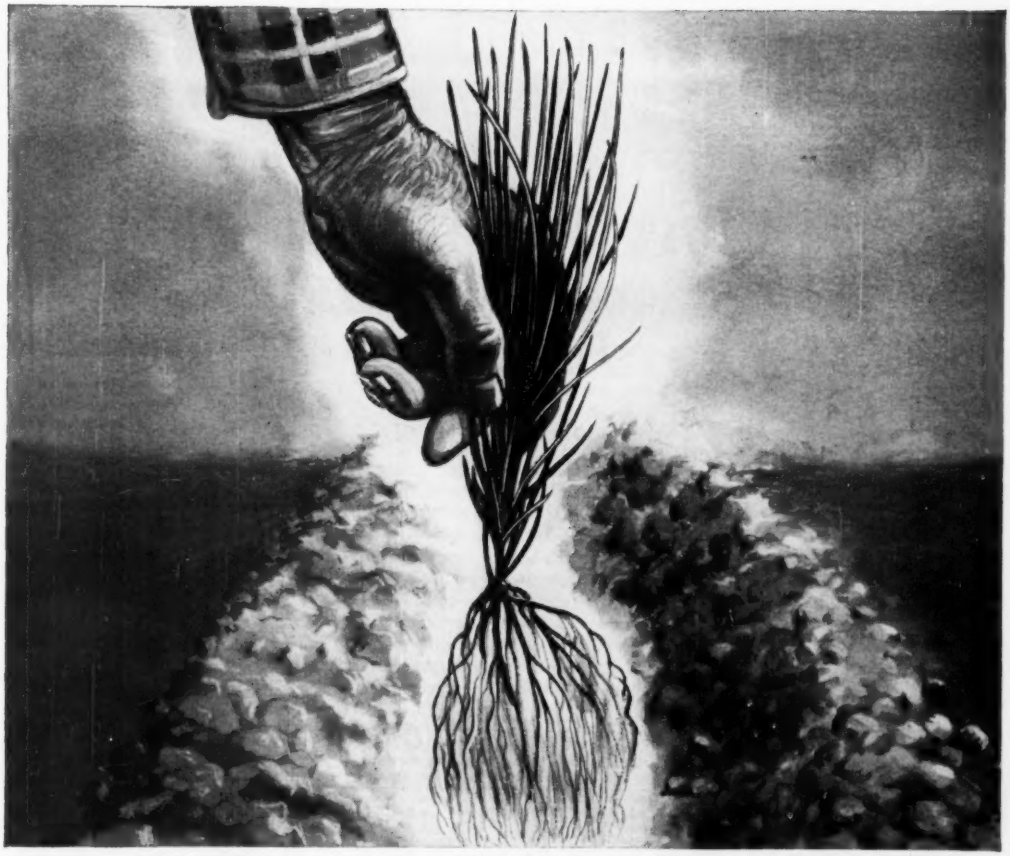
NBS sample designation	Temp. T at which flexural strength is at least 30% of control value for the three test[a] types		Temp. T at which flexural secant modulus of elasticity is at least 50% of control value for three test[a] types		Stress range
	Temp.		Temp.		
	°F.	°C.	°F.	°C.	lb./in.²
Unsaturated-polyester resin					
A	302	150	302	150	0-6,000
E	302	150	392	200	0-7,500
F	284	140 (est.)	392	200	0-4,000
G	266	130 (est.)	<302	<150	0-4,000
Acrylic addition resin					
C	<302	<150	<302	<150	0-5,000
Silicone resin					
B	617	325	617	325 (for 65% c, est.)	0-7,500
Phenolic resin					
H	392	200	428	220 (est.)	0-5,000
Melamine resin					
J	482	250	428	220 (est.)	0-10,000

[a] Tests at 77° F. (25° C.) after 200 hr. heating at temp. T, and tests at temp. T after 0.5 hr. or 200 hr. conditioning at temp. T.

Table V—Description of Materials

NBS material designation	Type of laminate[a]	Manufacturer	Thickness, avg.	Density	Resin: Type	Resin: Content, by weight	Reinforcement: Type	Reinforcement: Thread count, Warp	Reinforcement: Thread count, Filling	Reinforcement: Ply arrangement	No. of plies	Molding Conditions: Pressure	Molding Conditions: Curing temp., Initial	Molding Conditions: Curing temp., Maximum	Molding Conditions: Time, Curing	Molding Conditions: Time, Cooling
			(in.)	(g./cm.³)		(%)						(lb./in.²)	(° F.)	(° F.)	(min.)	(min.)
A1	Macerated-cotton-fabric, phenolic molding compound	Bakelite	0.121	1.37	Bakelite BM-199	..	Macerated cotton fabric	..	..	...	..	2100	250	320	15	5
B1	High-strength-paper, phenolic	Consolidated Water Power & Paper	0.121	1.43	...	..	Paper	..	..	Parallel	..	250	...	...	...	...
C1	High-strength-paper, phenolic	Consolidated Water Power & Paper	0.124	1.43	...	..	Paper	..	..	Crossed	..	250	...	...	...	...
D1	Lignin paper	Formica	0.128	1.38	Lignin	..	Lignin paper	..	..	...	..	....	...	...	...	...
E1	Glass-fabric, unsaturated polyester	Swedlow	0.116	1.70	Marco MR-1A	..	Glass fabric, plain weave ECC-11-162	29	17	Crossed	7	....	...	...	...	...
F1	Muslin-cotton-fabric, unsaturated polyester	Swedlow	0.131	1.27	Marco MR-1A	..	Cotton fabric (muslin), twill weave	70	48	...	7	....	...	...	...	...
H1	Enameled-duck cotton-fabric, unsaturated polyester	Pittsburgh Plate Glass, Columbia Chemical Div.	0.145	1.37	Allymer CR 39	62-65	Cotton fabric (enameled duck), plain weave	36	32	Crossed	6	1–5	158	239	2 hr. at 158° F., 10 hr. at 158-239° F.	gradual
I1	Grade C phenolic	Synthane	0.122	1.36	Bakelite No. 1112	48	Cotton fabric, plain weave, 10 oz./yd.²	50	40	Crossed	7	1800	...	340	50	20
J1	Grade L phenolic	Synthane	0.125	1.34	Bakelite BV-1112	48-52	Cotton fabric, plain weave, 3.7 oz./yd.²	80	80	Parallel	19	1620	...	320	45	25
K1	Grade AA phenolic	Synthane	0.149	1.50	Bakelite No. 2427	47	Asbestos fabric, plain weave, 18 oz./yd.²	18	16	Parallel	5	1800	...	340	50	20

[a] Material A1 was obtained in the form of sheets prepared from a molding compound; all of the other materials were laminated sheet products.



MOSINEE plants fibres for industry

In Mosinee Industrial Forests, seedlings by the thousands are being planted annually to replace the trees used for products of industry, assuring future supply of *fibres* vital to many products. • Also, on privately-owned acreage, Mosinee supplies the seedlings and know-how to convert otherwise waste land to fibre-producing forests for the future. • This reforestation is the first step in the process of making Mosinee Fibres that work for industry.

MOSINEE PAPER MILLS CO. • MOSINEE, WISCONSIN

MOSINEE makes fibres work for industry

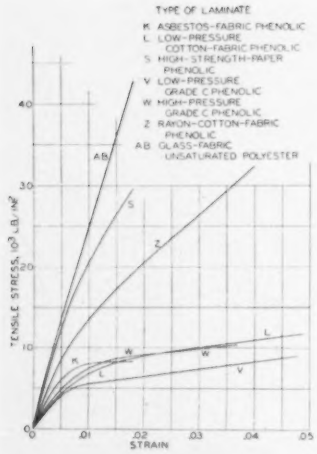


Fig 5—Tensile stress-strain curves of ⅛-in. thick laminates at 77° F.

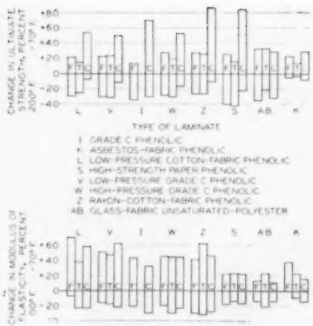


Fig. 6—Comparison of changes in flexural (F), tensile (T), compressive (C) properties of various laminates at —70 and 200° F. based on values at 77° F.

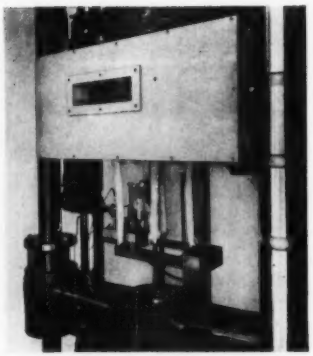


Fig. 7—Front view of flexural test enclosure for high-temperature tests. Recording deflectometer and Selsyn motor are visible at left below enclosure

laminates at high temperatures are not a function of temperature alone, but may be affected by further cure of the resin and loss of moisture content. The effect of high humidity in addition to an elevated temperature may be much different from the effect of the elevated temperature alone. A severe loss in strength was noted for the high-strength-paper and one low-pressure cotton-fabric laminate at 150° F. and 90% relative humidity.

The ratio of edgewise to flatwise impact strength for the ½-in.-thick phenolic laminates tested is nearly constant over the range of temperatures, —70 to 200° F.

Temperature Effect on Strength

With the development of higher speed aircraft and guided missiles there is a need for information on the mechanical properties of laminated plastics at temperatures much higher than 200° F. Accordingly, tests were undertaken to determine the flexural properties of promising laminates at temperatures up to 700° F. Commercial manufacturers and laminators were informed of the project and invited to submit samples of laminates which could be expected to be heat resistant. Glass-fabric laminates bonded with silicone, phenolic melamine, acrylic, and unsaturated-polyester types were received and tested. These are described in Table III.

Since testing at temperatures of

Table VI—Conditions Used in Accelerated Service Tests

Test	Period	Temp.	Rel. hum.	Conditioning between cycles[a]
	hr.	*°F.*	*%*	*hr.*
I. Moderate-temperature test (wet and dry)	24	140	85-90	48
	24	140	<10	
II. Moderate-temperature test (dry only)	72	140	<10	96
III. Severe-temperature test	24	160	70-75	48
	24	160	< 7	
IV. High-temperature test	24	175	95-100	48
	24	175	< 5	
V. High-low temperature test	24	175	70-75	
	24	-40	95-100	72
	24	175	< 5	
	24	-40	95-100	

[a] Conditioning between cycles is at 77° F. and 50% relative humidity.

Table VII—Changes in Weight and Dimensions of Plastics During Outdoor and Accelerated Weathering Tests

Material designation	Change during outdoor weathering test[c] two years	Changes during accelerated weathering test[d] 1 cycle	3 cycles	5 cycles	10 cycles
	(%)	(%)	(%)	(%)	(%)
WEIGHT					
A1	−1.05	−2.26	−3.10	−3.44	−3.98
B1[a]	1.63	−0.73	−0.62	−0.65	−0.76
B1[b]	1.68	−0.79	−0.76	−0.81	−0.98
C1	1.52	−0.85	−0.87	−0.97	−1.13
D1	0.30	−1.34	−1.70	−1.88	−2.10
E1	−0.49	−0.34	−0.43	−0.47	−0.56
F1	−0.22	−1.50	−1.85	−2.00	−2.26
H1	−0.20	−1.27	−1.58	−1.69	−1.93
I1	−0.79	−1.70	−2.25	−2.47	−2.74
J1	−0.92	−1.42	−1.88	−2.12	−2.42
K1	−0.84	−1.22	−1.36	−1.38	−1.36
LENGTH AND WIDTH					
A1	−0.18	−0.26	−0.38	−0.44	−0.54
B1[a]	−0.16	−0.14	−0.16	−0.16	−0.18
B1[b]	−0.20	−0.14	−0.14	−0.14	−0.20
C1	−0.16	−0.08	−0.10	−0.10	−0.08
D1	−0.12	−0.16	−0.20	−0.23	−0.30
E1	0.02	0.00	0.00	0.00	0.00
F1	−0.22	−0.20	−0.24	−0.28	−0.36
H1	−0.18	−0.19	−0.26	−0.29	−0.38
I1	−0.12	−0.16	−0.22	−0.26	−0.15
J1	−0.11	−0.14	−0.20	−0.22	−0.30
K1	−0.10	−0.07	−0.08	−0.07	−0.13
THICKNESS					
A1	0.46	−0.04	−0.04	0.08	−0.25
B1[a]	4.33	0.22	0.55	0.63	0.44
B1[b]	4.85	0.27	0.43	0.71	0.41
C1	4.06	0.03	0.14	0.27	−0.02
D1	1.10	−0.18	−0.11	−0.13	−0.41
E1	0.39	0.28	0.10	0.10	−0.19
F1	1.17	−0.19	−0.08	−0.14	−2.18
H1	0.96	0.11	0.02	0.12	−0.09
I1	−0.05	−0.13	−0.24	−0.13	−0.24
J1	−0.03	−0.08	−0.05	−0.19	−0.43
K1	−0.51	−0.05	−0.13	−0.15	−0.36

[a] Specimens cut lengthwise. [b] Specimens cut crosswise. [c] Washington, D. C.; specimens facing south on racks inclined at 45°. [d] Method No. 6023, Federal Specification L-P-406a.

Table VIII—Changes in Flexural Strength, Modulus of Elasticity, and Maximum Deflection in Flexure of Plastics During Outdoor and Accelerated Weathering Tests

Material designation	Initial strength, modulus, or deflection	Change during outdoor weathering test[b] 2 years	Changes during accelerated weathering test[d] 5 cycles	10 cycles
	(lb./in.²)	(%)	(%)	(%)
FLEXURAL STRENGTH				
A1	12,700	−13.4	−8.7	−25.9
B1[a]	42,600	−37.6	−14.3	−18.5
B1[b]	29,000	−39.3	−13.1	−15.9
C1	25,100	−35.3	−4.6	−7.7
D1	23,500	−24.3	−4.7	−4.3
E1	34,100	−2.6	−17.9	−11.1
F1	16,100	−20.5	1.9	−15.5
H1	13,100	−24.4	−3.0	−6.9
I1	22,900	−24.9	−6.6	−8.3
J1	17,400	−18.4	0.6	−1.2
K1	9,000	8.6	1.1	3.3
MODULUS OF ELASTICITY IN FLEXURE				
	(lb./in.²)			
A1	1,170,000	−40.2	−41.7	−47.2
B1[a]	3,363,000	−34.8	−16.9	[illegible]
B1[b]	1,845,000	−27.8	−20.6	[illegible]
C1	2,567,000	−29.4	−13.5	[illegible]
D1	1,920,000	−18.1	−10.6	[illegible]
E1	1,810,000	−7.1	−14.4	3.6
F1	706,000	2.0	−4.2	−8.8
H1	652,000	−25.3	−17.5	−17.9
I1	1,238,000	−18.2	−10.5	−14.7
J1	1,121,000	−22.1	−22.0	−25.3
K1	986,000	−1.9	11.6	13.8
MAXIMUM DEFLECTION IN FLEXURE				
	(mils)			
A1	24.0	41.7	43.3	45.8
B1[a]	26.4	−2.6	11.4	8.8
B1[b]	31.0	0.0	21.9	38.7
C1	27.4	0.0	24.1	23.4
D1	21.5	−10.2	8.8	10.7
E1	45.7	5.0	43.5	18.8
F1	72.7	−39.9	7.2	−8.2
H1	68.2	−40.2	−8.6	3.7
I1	65.2	−18.4	−8.9	−1.5
J1	41.2	−13.8	14.8	16.5
K1	21.0	6.2	−3.8	−4.8

[a] Specimens cut lengthwise. [b] Specimens cut crosswise. [c] Washington, D. C.; specimens facing south on racks inclined at 45°. [d] Method No. 6023, Federal Specification L-P-406a.

Naugatuck

ROYAL FAMILY OF PLASTICS

Naugatuck Marvinol is in your plastic future!

This could be the unveiling of a bright, new future for *your* products.

For the product wonders in this crystal ball have been worked by a marvelous material from which your products could be made — Naugatuck Marvinol vinyl resin.

Here is a Marvinol-made handbag — *soft* and *pliable* as leather — yet perfectly washable, and it *won't crack, peel, scuff or fade.*

Here Marvinol is *rigid* and *rugged*—in a fountain pen barrel. There it is *flexible*—in wire covering.

Here are high-style tapestries with a softly woven look and feel. And colorful upholsteries with a *stability* that *holds their shape and fit.* And a snag-free zipper that closes with *no track!*

All these and hundreds more products can be made with Marvinol — rigid as steel, flexible as fabric, crystal clear or opaque, in all colors. In fact, Marvinol can be almost anything *you* want to make it.

Marvinol comes from the Naugatuck Chemical Division of the United States Rubber Company — a basic source of raw materials. It's in the plastics business to *stay* and *grow* with you. Write us and see what Marvinol can do for *you.*

Naugatuck Chemical **Division of UNITED STATES RUBBER COMPANY**

207 ELM ST., NAUGATUCK, CONNECTICUT

BRANCHES: Akron • Boston • Charlotte • Chicago • Los Angeles • New York • Philadelphia • In Canada: Naugatuck Chemicals, Elmira, Ontario

MARVINOL® vinyl resins • KRALASTIC® styrene copolymers • VIBRIN® polyester resins

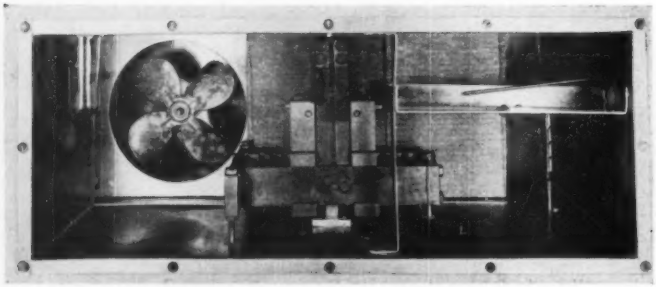


Fig. 8—Interior view of the flexural test enclosure used for high-temperature tests. Aluminum specimen tray and push rod for moving specimens into jig are located at right

700° F. presents problems not encountered in testing at room temperature or at 200° F., a considerable part of the project was devoted to the development of suitable equipment (Fig. 7 and 8) and procedures. Flexural tests were made under the following conditions: 1) at 77° F. and 50% relative humidity after 200 hr. heating at a temperature T; 2) at a temperature T after 0.5 hr. at the temperature T; 3) at a temperature T after 200 hr. at the temperature T; and 4) at 77° F. and 50% relative humidity without heating prior to testing. The temperature T was 302° F. (150° C.), 392° F. (200° C.), and 482° F. (250° C.) for condition 1; 302° F. (150° C.), 392° F. (200° C.), 482° F. (250° C.), 572° F. (300° C.), and 707° F. (375° C.) for condition 2; and 302° F. (150° C.), 392° F. (200° C.), 482° F. (250° C.), and 617° F. (325° C.) for condition 3.

The relative heat resistance of the laminates based on their behavior in flexural tests at the aforementioned conditions, is shown in Table IV. The performance of the individual materials under the various conditions of test is summarized in the following discussion.

The silicone laminate is superior to

Table IX—Description of Materials

NEMA designation	Type of laminate	Manufacturer	Thickness[a]	Density[a]	Resin		Reinforcement				Molding conditions				
					Designation	Content, by weight	Type	Thread count Warp	Thread count Filling	Ply arrangement	No. of plies	Pressure	Curing Temp. Initial	Curing Temp. Maximum	Time Curing	Time Cooling
			(in.)	g./cm.³		(%)						(lb./in.²)	(° F.)	(° F.)	(min.)	(min.)
C	High-strength-paper phenolic	Consolidated Water Power & Paper	0.121	1.42	...	..	Paper	..	..	Crossed	..	250	...	...	...	...
D	Lignin paper	Formica	0.128	1.38	Lignin	..	Lignin paper	..	..	...	...	...	...	...	...	...
E	Glass-fabric unsaturated polyester	Swedlow	0.134	1.69	Marco MR-1A	55-63	Glass fabric, plain weave	29	17	Crossed	7	...	...	...	...	...
F	Muslin-cotton-fabric unsaturated polyester	Swedlow	0.123	1.31	Marco MR-1A	..	Cotton fabric (muslin), twill weave	70	48	...	7	...	...	...	...	...
H	Enameled-duck cotton-fabric unsaturated polyester	Pittsburgh Plate Glass, Columbia Chemical Div.	0.147	1.36	Allymer CR 39	62-65	Cotton fabric (enameled duck), plain weave, 8 oz./yd.²	36	32	Crossed	6	1-5	158	239	2 hr. at 158° F. 10 hr. at 158-239° F.	Gradual
I	Grade C phenolic	Synthane	0.124	1.35	Bakelite BV-1112	48	Cotton fabric, plain weave, 10 oz./yd.²	50	40	Crossed	7	1800	...	340	50	20
J	Grade L phenolic	Synthane	0.124	1.34	Bakelite BV-1112	48-52	Cotton fabric, plain weave, 3.7 oz./yd.²	80	80	Parallel	19	1620	...	320	45	25
K	Grade AA phenolic	Synthane	0.145	1.49	Bakelite No. 2427	47	Asbestos fabric, plain weave, 18 oz./yd.²	18	16	Parallel	5	1800	...	340	50	20
L	Enameled-duck cotton-fabric phenolic	Bakelite	0.152	1.36	Bakelite BV-16887	52	Cotton fabric (enameled duck), plain weave, 8 oz./yd.²	84	28	Crossed	9	250	...	325	30	...
M	Canvas-cotton-fabric melamine	Formica	0.145	1.47	...	50-55	Cotton fabric (canvas), plain weave, 8 oz./yd.²	90	28	Parallel	11	1400	...	284-288	...	...
N	Canvas-cotton-fabric unsaturated polyester	Formica	0.150	1.13	Laminac	50-55	Cotton fabric (canvas), plain weave, 8 oz./yd.²	90	28	Parallel	7	15	...	230-248	...	...
S	High-strength-paper phenolic	Consolidated Water Power & Paper	0.122	1.42	Bakelite No. 16526	30	High-strength Mitscherlich paper	..	..	Crossed	54	250	...	310 ±10	12	Gradual
V	Low-pressure grade C phenolic	Synthane	0.150	1.26	Bakelite BV-16887	51	Cotton fabric (Army duck), plain weave, 10 oz./yd.²	50	40	Crossed	7	180	...	320	50	...
W	High-pressure grade C phenolic	Synthane	0.138	1.36	Bakelite BV-1112	47	Cotton fabric (Army duck), plain weave, 10 oz./yd.²	50	40	Crossed	7	1800	...	320	50	...
X	Glass-fabric unsaturated polyester	Pittsburgh Plate Glass, Columbia Chemical Div.	0.125	1.64	Allymer CR 149	50-55	Glass fabric (ECC-11-162), plain weave, 12 oz./yd.²	28	16	Crossed	6	1-5	176	207	18 hr. at 176° F. 1 hr. at 207° F.	Gradual
Y	Glass-fabric unsaturated polyester	Pittsburgh Plate Glass, Columbia Chemical Div.	0.114	1.66	Allymer CR 39	48-50	Glass fabric (ECC-11-162), plain weave, 12 oz./yd.²	28	16	Crossed	6	1-5	176	207	15 hr. at 176° F. 1 hr. at 207° F.	Gradual
Z	Rayon-fabric phenolic	Formica	0.160	1.35	Ironsides 91-L	37-40	Rayon fabric (Celanese Corp., WE-3975), high tenacity Fortisan rayon warp thread, cotton filling thread, twill weave, 12.5 oz./yd.²	75	12	Crossed	6	1100	...	320	Temperature allowed to remain over 302° F. for 20 min.	20
AA	Glass-fabric unsaturated polyester	Marco Chemicals	0.118	1.69	Marco MR-17B	45.5	Glass fabric (ECC-11-162), plain weave	29	17	Parallel	7	None	140	240	1 hr. at 140° F. 1 hr. at 240° F.	...
AB	Glass-fabric unsaturated polyester	Air Forces, Technical Service Command	0.130	1.84	Plaskon 900	43	Glass fabric (ECC-112), heat treated, plain weave	40	40	Parallel	45	40	180	220	2 hr. at 180° F. 2 hr. at 220° F.	...

[a] Average for all specimens tested.

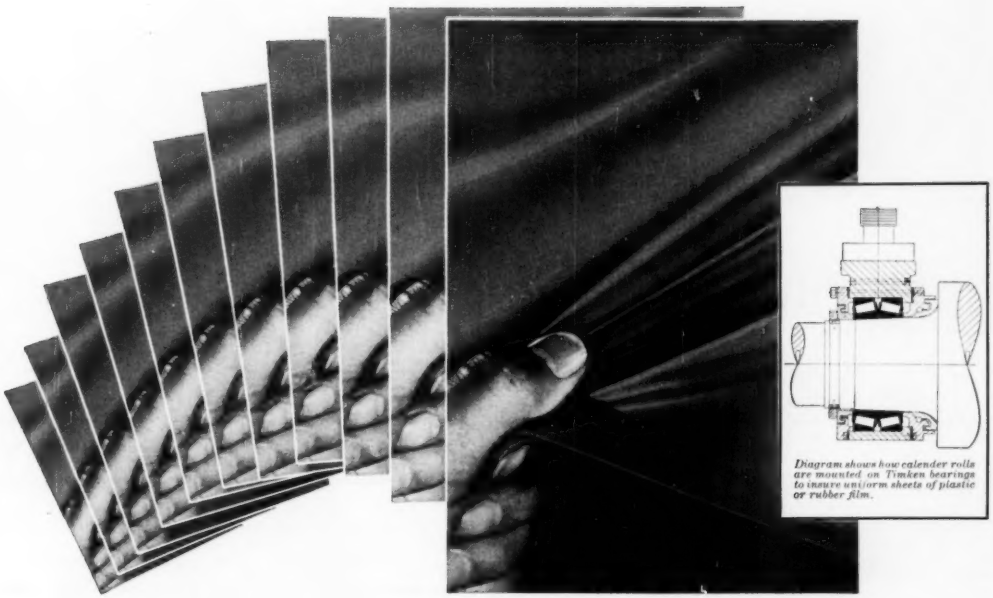


Diagram shows how calender rolls are mounted on Timken bearings to insure uniform sheets of plastic or rubber film.

Now you can get uniform gage and color over and over again!

PRECISION control of plastic film and rubber sheeting gage is now possible with calender rolls mounted on Timken® tapered roller bearings. Uniform thickness is assured, variation in color shades is eliminated, losses due to rejects are cut to a minimum.

Timken bearings may be properly adjusted to assure free rotation, without looseness, when the calender rolls come up to operating temperature—maintaining accurate control of gage. Vertical roll movement is minimized. As a result calender precision is maintained day in, day out. Rolls are kept in positive, accurate alignment at all times.

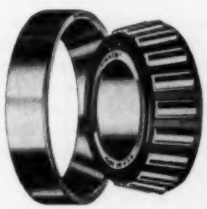
Due to tapered construction, Timken bearings take any combination of radial and thrust loads. True rolling motion and an incredibly smooth surface finish make friction negligible. Roll neck wear is eliminated. Maintenance costs are minimized.

Timken bearings are backed by over 50 years of bearing research and development, and are first choice throughout industry. They offer special advantages to you. For full information on Timken bearing application for calenders, mills, refiners, and mixers, write The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ontario. Cable address: "TIMROSCO".

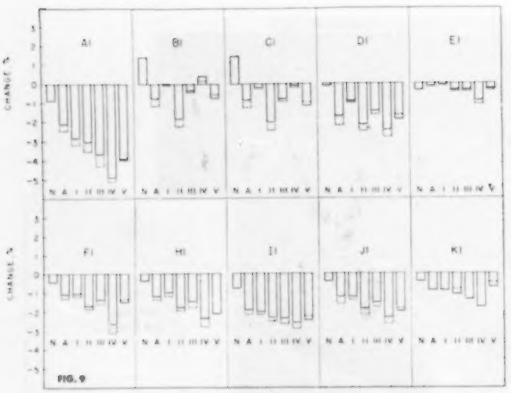
TIMKEN

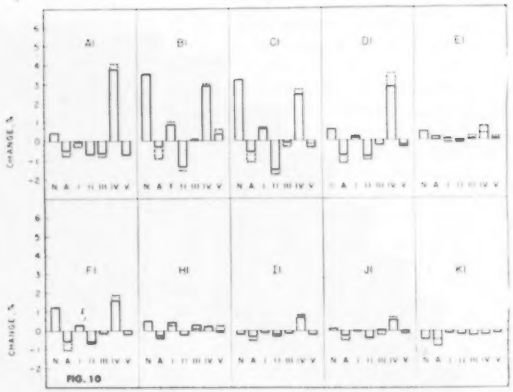
TRADE-MARK REG. U.S. PAT. OFF.

TAPERED ROLLER BEARINGS



NOT JUST A BALL ○ NOT JUST A ROLLER ▭ THE TIMKEN TAPERED ROLLER ▭ BEARING TAKES RADIAL ◎ AND THRUST ◣ LOADS OR ANY COMBINATION ✳





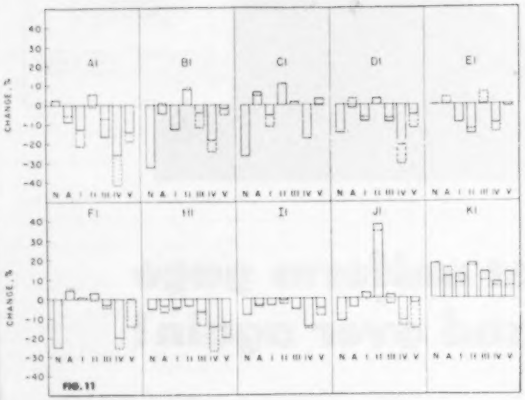


Fig. 9—Weight changes of laminates in weathering-service tests

Fig. 10—Laminate thickness changes in weathering-service tests

Fig. 11—Laminate flexural strength change, weathering-service tests

KEY TO SYMBOLS IN FIG. 9, 10, AND 11

Materials	*Tests*
A1) phenolic macerated	N) outdoor weathering, 1 year
B1) phenolic paper, parallel-ply	A) accelerated weathering, sun-lamp-fog, method 6021, Fed. Spec. L-P-406a—solid line, 120 hr.; dotted line, 240 hours
C1) phenolic paper, crossed-ply	
D1) lignin paper	
E1) glass polyester	
F1) muslin polyester	
H1) duck polyester	I-V) accelerated service tests, method 6011, Fed. Spec. L-P-406a—solid line, 5 cycles; dotted line, 10 cycles
I1) grade C phenolic	
J1) grade L phenolic	
K1) grade AA phenolic	

the other laminates tested in retention of flexural properties at temperatures of 482° to 572° F. When tested at about 617° F. after either 0.5 hr. or 200 hr. heating at that temperature, this laminate retained at least 30% of its initial flexural strength and over 50% of its initial flexural modulus of elasticity.

The phenolic laminate showed good retention of its flexural properties when tested at elevated temperatures after heating for 0.5 hr. at the test temperature. When tested in this way at 707° F., the flexural strength was 15,000 p.s.i., and the modulus of elasticity was 1.0×10^6 p.s.i., values roughly one-third of the corresponding values for the controls. The behavior of the phenolic laminate after prolonged heating was much less satisfactory; at 77° or 482° F. after 200 hr. heating at 482° F. the flexural strength was much less than 1000 p.s.i.

The melamine laminate, although much inferior to the phenolic laminate when tested at a temperature of 707° F. after 0.5 hr. heating, was superior to the phenolic in retention of flexural strength after 200 hr. heating at 482° F.

The four polyester laminates lost at least 80% of their flexural strengths when tested at 482° F. after either 0.5 or 200 hr. heating.

The acrylic addition laminate lost at least 80% of its flexural strength when tested at 302° F. after either 0.5 or 200 hr. heating.

For each laminate and each test condition, loss in flexural modulus of elasticity correlates with loss in flexural strength; the former loss is less than the latter.

The loss in flexural properties during prolonged heating may depend on the method of exposing the specimens in the oven. For specimens of the polyester and phenolic laminates, heating in a circulating-air oven in open bottles caused significantly less loss in flexural properties than did heating on the shelves of the oven.

These conclusions, except for the polyester laminates, are based on data for only one sample of each type of glass-fabric laminate and hence can be considered only tentatively as being representative of the various categories of laminated material.

Laboratory and Outdoor Aging Tests

The effects of outdoor weathering, accelerated weathering, and accelerated service conditions on the weight, dimensions, and flexural properties of representative phenolic and unsaturated-polyester plastics were determined. The test materials were commercial products, and included nine laminated plastics and

(*Continued on p. 182*)

Bright Colors spur Plastics Sales

Utility and durability in plastics are now being taken for granted. New, gay colors are the focal point of many merchandising programs.

CALCO's complete line of dyes and pigments, both organic and inorganic, is standardized to meet the particular needs of processors and users of plastics products.

CALCO's Technical Service Staff, with the facilities of its full-time plastics research laboratory, helps to maintain and improve the quality of your plastics products.

Calco Products for the Plastics Industry

Pigments
- Ultramarines
- Cadmiums
- Chrome Yellows, Oranges and Greens
- Phthalocyanine Blues and Greens
- Iron Blues
- Organic Toners and Lakes

UNITANE® (Titanium Dioxide)
- Anatase and Rutile Types

Dyes
- Oil Soluble Dyes
- Spirit Soluble Dyes
- Nigrosines
- Specialties

Calco®

AMERICAN *Cyanamid* COMPANY

CALCO CHEMICAL DIVISION
DYESTUFF DEPARTMENT
BOUND BROOK, NEW JERSEY

New York • Chicago • Boston • Philadelphia • Charlotte • Providence

PLASTICS DIGEST*

Abstracts from the world's literature of interest to those who make or use plastics or plastics products. Send requests for periodicals to the publishers listed.

General

EXPANSION REQUIREMENTS FOR THE FRENCH PLASTICS INDUSTRY. P. Dubois. Brit. Plastics *24*, 128-33 (Apr. 1951). Economic statistics and information on the French plastics industry are presented.

SAFE USE OF PLASTICS—THE UL VIEWPOINT. K. S. Geiges. Electrical Manuf. *47*, 110-11, 226, 228, 230, 232 (May 1951). The tests made by the Underwriters Laboratories on plastics and the resulting viewpoint on the use of plastics for specific applications are discussed.

PAINT, VARNISH, AND PLASTICS CHEMISTRY. C. R. Bragdon and M. M. Renfrew. Ind. Eng. Chem. *43*, 1272-82 (June 1951). The history of paint, varnish, and plastics chemistry is reviewed.

PACKAGING PLASTICS FOR EXPORT. Brit. Plastics *24*, 84-8 (Mar. 1951). The methods used for packaging various types of plastic materials for export shipment in Britain are described.

BRITISH PLASTICS FOR THE WORLD. Brit. Plastics *24*, 62-77 (Mar. 1951). Export statistics on British plastics are presented.

Materials

THERMAL INSULATING MATERIALS: A RESERVOIR OF DESIGN IDEAS. A. E. Javitz. Electrical Manuf. *47*, 86-91, 250, 252, 254, 256, 258, 260, 262, 264 (May 1951). The properties and applications of thermal insulating materials are described. The materials considered include foamed polystyrene, urea-formaldehyde resin, phenolic resin, cellulose acetate and rubber, rockwool, glass fiber, cork, woodboard, expanded wood and silica, and aluminum foil.

TRIESTERS OF CORN STARCH, AMYLOSE, AND AMYLOPECTIN. I. A. Wolff, D. W. Olds, and G. E. Hilbert. Ind. Eng. Chem. *43*, 911-14 (Apr. 1951). A preferred approach to the discovery of industrial uses for triesters of corn starch, corn amylose, and amylopectin is the detailed study of the properties of such esters and of products derived therefrom. Applications can then be sought where the need exists for materials having such properties. The melting ranges, plastic properties, viscosities, x-ray diffraction patterns, film characteristics, and possible uses as lacquer-type protective coatings of these triesters were investigated and are reported in some detail. The amylose esters resemble the esters of cellulose in many respects and appear to merit consideration if economic availability of the linear starch fraction can be achieved.

POLYARYLENE-ALKYLENE SULFIDES. C. S. Marvel and P. D. Caesar. J. Am. Chem. Soc. *73*, 1097-9 (Mar. 1951). Aryl dithiols and biallyl react in emulsion polymerization systems to produce polyarylene-alkylene sulfides of high molecular weight and high melting point. Some of these polymers give orientable fibers on cold drawing. The introduction into the emulsion of an inert organic solvent such as benzene or methanol and an increase in polymerization temperature improves the yields when high melting dithiols are used in these polymerizations. Methods for the preparation and purification of some aryl dithiols were evaluated and developed.

ALIPHATIC ACID ESTERS OF CELLULOSE. PREPARATION BY ACID CHLORIDE-PYRIDINE PROCEDURE. C. J. Malm, J. W. Mench, D. L. Kendall, and G. D. Hiatt. Ind. Eng. Chem. *43*, 684-8 (Mar. 1951). A series of cellulose esters from acetate through palmitate was prepared by the acid chloride-pyridine procedure. This was accomplished by careful selection of conditions, including reagent ratios, tertiary amine, reaction diluent, and cellulose used. Acyl and hydroxyl analyses showed good agreement with calculated values, indicating substantially complete esterification. Intrinsic viscosity results on the esters varied with the acyl group and with the solvent used. Intrinsic viscosity values of their regenerated celluloses indicated that the esters were of substantially the same degree of polymerization. The acid chloride–pyridine procedure thus was found to be capable, under certain conditions, of preparing fully esterified derivatives with the same degree of polymerization.

BANDSAWING OF PLASTICS. H. J. Chamberland. Brit. Plastics *24*, 16-18 (Jan. 1951). The techniques of bandsawing and bandfiling of various types of plastics are described. Types of blades and saw velocities for each type of plastic are given.

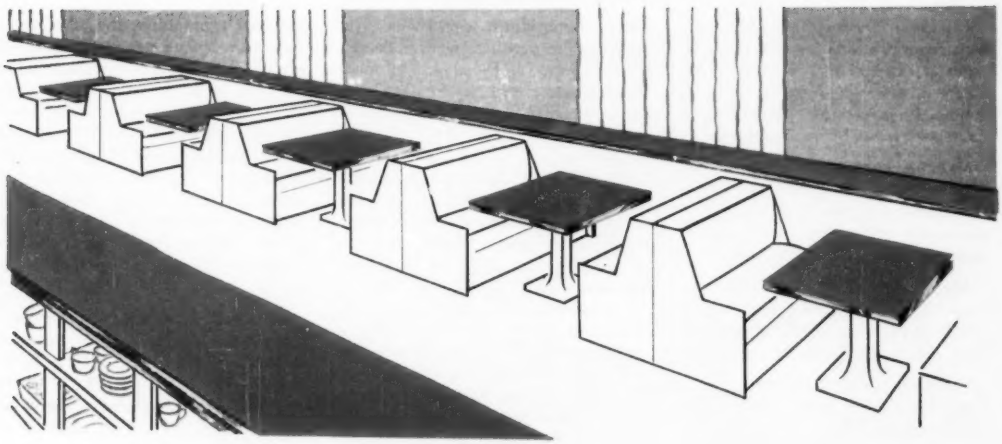
ACID-CATALYZED REACTION OF NITRILES. II. POLYMIDES FROM FORMALDEHYDE AND DINITRILES. E. E. Magat, L. B. Chandler, B. F. Faris, J. E. Reith, and L. F. Salisbury. J. Am. Chem. Soc. *73*, 1031-5 (Mar. 1951). The reaction of adiponitrile with formaldehyde in strong sulfuric acid solution at room temperature was studied in detail. Infra-red, osmotic pressure, end-group determination, and solubility data show that the polymer formed is polymonomethylene adipamide (16 nylon). Infra-red determinations of cyanide end groups suggest that the polymer is highly branched because of the large excess of cyanide ends; however, the hydrogenated polymer shows a disproportionately small number of amino ends that arise from hydrogenation of the nitrile ends. The polymer is unusually sensitive to degradation by acids; in 90% formic acid solution at 30° C. the molecular weight of the polymer is cut to one-half of its original value in 1 hour. The polymerization was extended to dinitriles other than adiponitrile and to aldehydes other than formaldehyde.

Molding and Fabricating

METAL FINISHING PLASTICS BY VACUUM COATING. L. Holland. Brit. Plastics *24*, 97-102 (Mar. 1951). The technique for coating molded plastic products with metal by a vacuum evaporation and depositing process is described.

"DURESTOS" FELTS—EXPERIMENTS IN MOLDING WITHOUT PRESSURE. G. May. Plastics (London) *16*, 120-2

* Reg. U. S. Pat. Office



processing decorative laminates?

No. 324 PLYOPHEN

steps up the PACE and PROFIT

Here is an alcohol soluble phenolic resin which is daily demonstrating its ability to produce higher quality decorative laminates—faster! Quality improves because No. 324 has the same flow characteristics as the resins commonly used in applying the decorative surface sheet, thereby assuring an attractive product free of any appearance-marring defects. Then too, speed of production increases because No. 324 reduces treating machine time by as much as 50-75%. Add to this No. 324's excellent storage stability and phenomenal treating machine yields, and you have further evidence of how this top quality resin can increase your production and profits! Further information together with a working sample may be obtained by writing direct to the RCI Sales Department at Detroit.

REICHHOLD CHEMICALS, INC.

General Offices and Main Plant, Detroit 20, Michigan

RCI

Other Plants: Brooklyn, New York
Elizabeth, New Jersey • South San Francisco and Azusa, California • Tuscaloosa, Alabama • Seattle, Washington • Chicago, Illinois • Charlotte, N. C.
Liverpool, England • Paris, France • Sydney, Australia • Sassenheim and Apeldoorn, Holland • Naples, Italy • Buenos Aires, Argentina • Hamburg, Germany
Toronto and Port Moody, Canada • East London, South Africa • Osaka, Japan • Werndorf, Austria • Gothenburg, Sweden • Zurich, Switzerland

SYNTHETIC RESINS • CHEMICAL COLORS • PHENOLIC PLASTICS • PHENOL • GLYCERINE
PHTHALIC ANHYDRIDE • MALEIC ANHYDRIDE • SODIUM SULFATE • SODIUM SULFITE

(May 1951). The molding of large objects from asbestos felt and phenolic resin is described. The process requires no pressure. A motor car door, orthopedic jackets, and radio cabinets have been made by this technique.

VACUUM MOLDING OF PLASTICS. W. Kosy. SPE J. 7, 5-6, 20 (Apr. 1951). Directions are given for building inexpensive equipment for vacuum molding of sheet thermoplastics.

MECHANICAL TRIMMING OF MOLDINGS. Brit. Plastics 24, 50-1 (Feb. 1951). Devices for removing the flash from plastic moldings are described.

STYRENE IN LARGE MOLDINGS. S. E. Glick SPE J. 7, 28-31 (Feb. 1951). The properties of polystyrene of particular interest in large moldings are discussed.

Applications

PRE-BAGGED APPLES. E. W. Carlsen. Modern Packaging 24, 110-13, 188 (May 1951). Apples are packed in bags made of rubber hydrochloride and polyethylene.

EXTENDING USE OF PLASTICS FOR REFRIGERATORS. Brit. Plastics 24, 108-11 (Apr. 1951); Plastics (London) 16, 87-89 (Apr. 1951). The parts of an English refrigerator, which are injection molded from polystyrene, a styrene-butadiene copolymer, and polyvinyl chloride, are described.

COMPRESSION MOLDED REINFORCED PLASTICS NOW FINDING INDUSTRIAL APPLICATIONS. T. D. Du Mond. Materials & Methods 33, 60-1 (Feb. 1951). The properties and applications of compression molded glass-reinforced plastics are reviewed.

EXPANDED UREA-FORMALDEHYDE. Brit. Plastics 24, 103 (Mar. 1951). Expanded urea-formaldehyde resin is used as a packing medium for glass objects and glass bottles.

LIQUIDS IN FILM-LINED FIBER. E. S. Schneider. Modern Packaging 24, 181-5 (Apr. 1951). Liquids, up to 400 lb., are shipped in fiber drums which are lined with a polyethylene bag.

Properties

MECHANISM OF THE DEGRADATION OF POLYAMIDES. B. G. Achhammer, F. W. Reinhart, and G. M. Kline. J. Research National Bureau Standards 46, 391-421 (May 1951). Films of polyamides were exposed to heat, ultra-violet radiant energy, and different atmospheric conditions. The degradation products were collected in some cases and analyzed by mass spectrometric techniques. The unexposed and exposed specimens were examined by the following techniques to obtain information concerning the changes in chemical and physical structure of the polymer: infra-red absorption, ultra-violet absorption, viscosity of solutions, measurement of dielectric constant and dissipation factor, photomicrography, X-ray diffraction, electron microscopy, electron diffraction, and effect of organic liquids. In addition, pyrolysis studies were made and some physical properties were determined. Polyamide molecules are relatively unaffected by exposure to moderate temperature (60° C.). However, loss of water and other volatile materials may cause changes in physical properties. The effects of exposure to ultra-violet radiant energy are more pronounced, and degradation of the polyamide molecule occurs with accompanying loss of water and other volatile materials that act as plasticizers. The results of this investigation show that the general course of the degradation of polyamides is as follows: 1) The polymer molecules break at the C-N bond of the peptide group creating smaller polymer molecules with the same unit of chemical structure; the fragments broken out are evolved as carbon dioxide, carbon monoxide, water, and hydrocarbons; 2) the degree of crystallinity or local order changes, including alterations in hydrocarbon packing, dipole arrangement, and hydrogen bridging; 3) the amount of strongly bound water and/or organic liquids changes. The latter materials are probably bound by hydrogen bridging to the oxygen of the peptide group; they act as plasticizers for the polyamides.

EFFECT OF FUNGUS GROWTH ON THE TENSILE STRENGTH OF PRESSURE-SENSITIVE ELECTRICAL INSULATING TAPES. S. Berk and L. Teitell. ASTM Bull. No. 174, 67-71 (May 1951). Twenty-three pressure-sensitive electrical insulating tapes were tested for fungus resistance using a mixed spore suspension of five species of fungi. Plastic tapes, such as cellulose acetate film and cloth, cellulose acetate butyrate, vinyl, polyethylene, and neoprene had no more than slight mold growth and no more than slight changes in breaking strength. Glass-fabric tapes were susceptible to mold growth but showed no appreciable loss in breaking strength. Paper, cloth, and friction tapes were deteriorated by mold and showed large losses in breaking strength. Flat-stock paper tape treated with phenyl mercuric saccharinate (0.84%) offered some protection against mold attack and had the least loss in breaking strength of treated paper tapes.

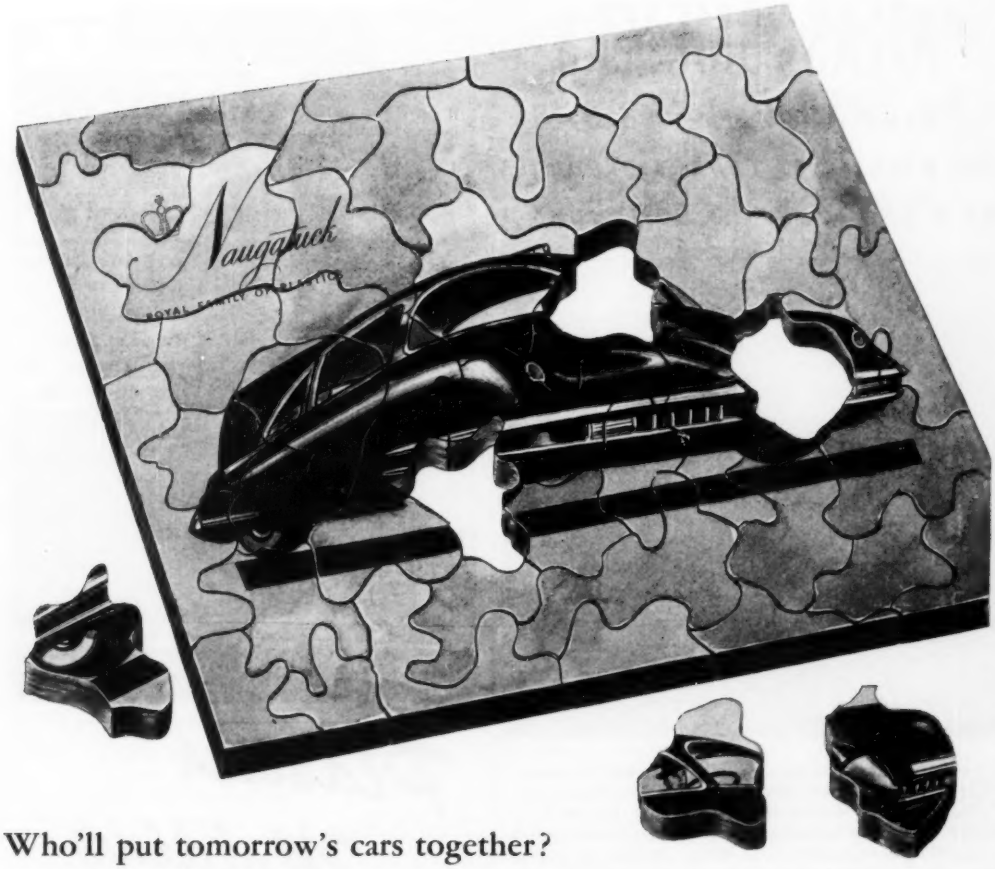
THERMAL PROPERTIES OF CERTAIN LAMINATED PLASTICS. E. M. Schoenborn, A. A. Armstrong, Jr., and K. O. Beatty, Jr. ASTM Bull. No. 174, 54-9 (May 1951). The thermal diffusivity, conductivity, and heat capacity of several types of laminated plastics were measured by unsteady-state methods. The methods are rapid. These three thermal properties of laminated plastics vary significantly with the type of filler and resin.

ELEVATED TEMPERATURE CREEP AND FATIGUE PROPERTIES OF A POLYESTER GLASS-FABRIC LAMINATE. W. N. Findley and W. J. Worley. SPE J. 7, 9-17 (Apr. 1951). The following tests are reported for glass fabric laminates molded at 13 p.s.i. pressure with Laminac 4126 polyester resin: tension and compression tests at 77° F.; time-to-fracture creep tests at 77° F. in still air and in an air-blast; and fatigue tests at 180 and 300° F. The fatigue strength of this laminate was found to be much more sensitive to temperature than that of laminates previously tested. A decrease in the fatigue strength at 10^7 cycles of about 67% (from 10,900 p.s.i. at 77° F. to 3500 p.s.i. at 300° F.) was observed. The effect of temperature on the fatigue strength appeared to follow the power law previously observed. The time-to-fracture tests indicate a reduction in creep strength at 120 hr. under load of about 21% from 31,500 p.s.i. at 77° F. to 25,000 p.s.i. at 400° F. Substantial shrinkage occurred with time at 400° F.

Testing

ANALYTICAL EXAMINATION OF PLASTICIZERS OBTAINED FROM POLYVINYL CHLORIDE COMPOSITIONS. J. Haslam, W. Sopper, and H. A. Willis. J. Applied Chem. 1, 112-24 (Mar. 1951). Methods that have proved useful in the chemical and infra-red examination of plasticizers used in polyvinyl

(*Continued on p. 131*)



Who'll put tomorrow's cars together?

***If you were making* automobiles, would you consider our new Vibrin polyester?**

What kind of fenders would this polyester make? The answer is here—thermo-setting polyester laminates have already produced the fenders every husband hopes for. They're dent-proof.

What about the car body itself? No need to guess—the automotive world has seen its first polyester roadster body. And an eye-opener it is!

Lighter than the lightest common metal.

Stronger than the strongest metal.

A solid surface-to-surface color that won't chip, crack or peel and a beauty to behold!

Resistant to everything that bothers automobile bodies—weather, water, exhaust fumes, sun, everything.

Produced with fewer pieces—with or without pressure or heat—at a small percentage of metal toolage costs.

Does this mean your car of the future will have "Body by Vibrin"? No one can tell now. But you can tell that the unusual polyester properties of Vibrin laminates can do fine things for your products from buttons to bathtubs. Investigate today.

Naugatuck Chemical

Division of **UNITED STATES RUBBER COMPANY**
NAUGATUCK, CONNECTICUT

BRANCHES: Akron • Boston • Charlotte • Chicago • Los Angeles • New York
Philadelphia • **In Canada:** Naugatuck Chemicals, Elmira, Ontario

Naugatuck Chemical Plastics Division, Elm St., 28, Naugatuck, Conn.

Without charge, send technical data on properties, uses, handling methods (specify desired end products).

I understand that, from this data, I can order suitable, free experimental samples.

NAME ..... TITLE .....

COMPANY .....

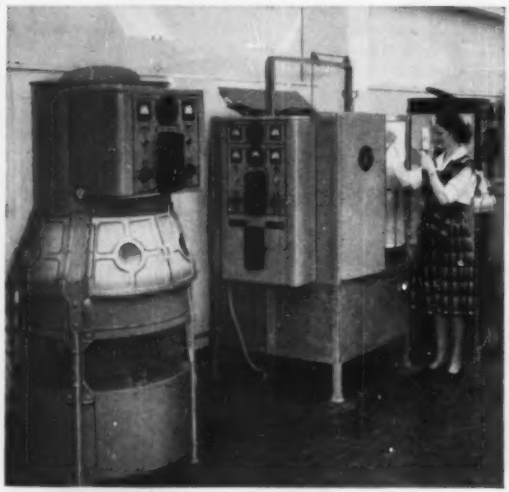
ADDRESS .....

CITY ..... ZONE ..... STATE .....

MARVINOL® vinyl resins • **KRALASTIC®** styrene copolymers • **VIBRIN®** polyester resins

ATLAS-OMETERS

. . . used in Quality Control for plastic or rubber products at B. F. Goodrich Company



An important part of the tests at B. F. Goodrich Company Laboratories involves subjecting products to the destructive effects of weathering conditions they will be expected to meet in service. By using Atlas Fade-Ometers and Weather-Ometers it is often possible to obtain quickly, in advance of actual service, assurance that new materials will have satisfactory resistance to cracking, sun-checking, chalking, fading or bleeding of color, or to loss of elastic properties.

In the Fade-Ometer—used to check the reaction of any material or type of finish to the deteriorating effects of sunlight—plastic materials such as Koroseal are tested for permanence of bright color. The Weather-Ometer—which accurately duplicates rain, heavy dew, sunlight and thermal shock—offers complete control of these elements so that any desired climatic cycle can be obtained. Results of tests in the Weather-Ometer are used in the evaluation of the aging and weathering characteristics of rubbers and plastics under accelerated conditions corresponding to outdoor exposure.

The machines are easy to operate, fully automatic, and may safely be left in continuous operation overnight without attention from the operator.

ATLAS ELECTRIC DEVICES CO.
361 West Superior St. Chicago 10, Illinois
WEATHER-OMETERS • FADE-OMETERS • LAUNDER-OMETERS

SYNTRON

PARTS FEEDERS

PROVIDE AN ECONOMICAL ANSWER TO THE FEEDING OF PARTS

HERE'S HOW two Feeders solved the problem of feeding screws on a combination counting and packaging machine.

Small, medium or large parts of various shapes and materials . . . Syntron Parts Feeders will feed them single file . . . in oriented position . . . at variable rates . . . and without damage . . . to grinders and presses, inspection and counting and packaging devices, and other automatic processing equipment.

Operates by controlled vibration—no motors, gears, cams, belts or other wearing parts to require expensive maintenance. Units are also very compact.

Catalog data upon request. Or send details of your problem along with sample parts to . . .

SYNTRON CO.
390 Lexington Ave. Homer City, Pa.

Plastics Molding

for America's LEADING MANUFACTURERS

ALL MATERIALS — ALL METHODS

Northern

40 YEARS OF PLASTIC MOLDING EXPERIENCE

INDUSTRIAL CHEMICAL CO.

11 ELKINS ST., SO. BOSTON, MASS., SOuth 8-4240

BRANCH OFFICES

441 Lexington Ave. New York, N. Y. Tel. VAnderbilt 6-1684 | 627 Powers Bldg. Rochester 4, N. Y. Tel. BAker 8701 | P.O. Box 5604 Phila. 29, Pa. Tel. Victor 4-8679

chloride compositions are summarized. Information is given about the method of isolation of the plasticizer and the qualitative tests that may be applied. On the quantitative side, attention is given to the saponification value and the determination of phthalate, phosphate, and chlorine. Methods which proved useful in the isolation of the alcohols derived from ester-type plasticizers are described. The infra-red spectra of 19 common plasticizers are presented, and the use of these spectra in the identification of plasticizers and the qualitative and rough quantitative analysis of plasticizer mixtures is described. The examination by infra-red spectroscopy of extracts from plasticizers, such as alcohols and unsaponifiable material, is described as an aid to identification of plasticizer mixtures.

BONDING BUTYL RUBBER TO BRASS. R. W. Kaercher and G. W. Blum. Ind. Eng. Chem. 43, 488-93 (Feb. 1951). The results of an investigation of some factors important in the adhesion of butyl-type synthetic rubber to a series of brass compositions are presented. A testing method for the evaluation of comparative bonding strength is shown, based on the pounds per square inch of tensile pull, normal to the plane of bonding, required to rupture the bond. Brass sheets of nominally 95, 90, 85, and 70% copper, with the balance essentially zinc, were employed. Brass disks used for bonding had 1 sq. in. of bonding surface and were bonded by sandwiching a sheet of uncured butyl rubber between two disks. Following each experimental determination, the disks were resurfaced and re-used. A standardized testing procedure was employed throughout the work reported. The influence of methods of surface preparation, pickling conditions, and surface contamination on the various brass compositions is shown graphically. The essential need for uniform surface preparation is shown; accompanying photomicrographs illustrate the various degrees of surface uniformity, as well as the non-uniform attack of the acid on the machined surface when preliminary polishing is eliminated. Optimum conditions found in this investigation are reported for the time, temperature, and pressure of cure, effect of brass composition, and the relative strength obtained from different methods of surface preparation.

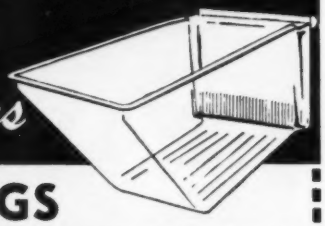
A NOMOGRAM FOR CALCULATING THE STIFFNESS OF ELASTOMERS. T. B. Blevins and M. G. DeFries. ASTM Bull. No. 173, 50-60 (Apr. 1951). A nomogram for calculating the stiffness of materials when tested with a Tour-Marshall stiffness machine (ASTM D 747) is presented.

RECENT WORK ON TRACKING IN SOLID INSULATING MATERIALS. V. E. Yarsley and W. D. Owen. Brit Plastics 24, 122-7 (Apr. 1951). The phenomenon of electrical tracking on plastic materials and methods of test are discussed. Tracking is often due to moisture and other surface contamination as well as deterioration of the plastic.

Chemistry

KINETICS OF THE UNCATALYZED REACTIONS BETWEEN RESORCINOL AND FORMALDEHYDE. R. A. V. Raff and B. H. Silverman. Ind. Eng. Chem. 43, 1423-7 (June 1951). A systematic study of the kinetics of the resorcinol-formaldehyde condensation was undertaken. The reaction was studied

From Ash Trays to Refrigerator Bins



SINKO MOLDINGS

ARE KNOWN FOR THEIR EXACTNESS AND UNIFORMITY

Whether your parts or products are molded in Nylon or any other thermoplastic material, you may count on us to produce them for you *accurately and on schedule.*

We're set up to handle all your injection molding from 4 oz. to 60 oz. . . . also have excellent facilities for precision-producing your metal-plastic assemblies, no matter how intricate.

You'll be well pleased with SINKO MOLDINGS . . . be sure to call on us soon . . . we welcome your inquiries.

Our equipment includes some of the best and most modern machines (as pictured) for *precision molding of all Thermoplastics.*

Sinko MANUFACTURING & TOOL CO. 3135 WEST GRAND AVENUE CHICAGO 22, ILLINOIS

Complete Line of

Machinery for Celluloid and Plastics Mfrs.

JOHN J. CAVAGNARO

HARRISON ESTABLISHED 1881 Engineers and Machinists NEW JERSEY

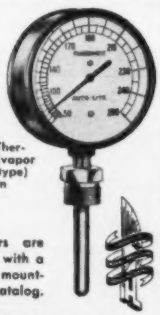
Presses for Dehydrating, Filtering, Caking, Polishing, Stuffing, etc.

Mixers: Plain or Stainless
Preliminary or Vacuum

Depend on **AUTO-LITE**

FOR TEMPERATURE INDICATION

Model G Thermometer (one-to-one ratio, liquid filled type) Priced from $18.



Model V Thermometer (vapor pressure type) Priced from $10.25.

Auto-Lite Indicating Thermometers are available in many types and sizes, with a choice of temperature ranges and mountings to meet your needs. Send for catalog.

THE ELECTRIC AUTO-LITE COMPANY
INSTRUMENT AND GAUGE DIVISION • TOLEDO 1, OHIO
NEW YORK CHICAGO SARNIA, ONTARIO

AUTO-LITE
INDICATING & RECORDING THERMOMETERS

in dioxane, without a catalyst, at various temperatures, and for different mole ratios of resorcinol to formaldehyde. The apparent first order of the reaction, the energy of activation (around 19 kg.-cal.), and the temperature coefficient (around 2.3/10° C.) were found to remain constant as the uncatalyzed resorcinol-formaldehyde condensation progresses, and were practically independent of the resorcinol-formaldehyde ratio. Resorcinol has considerably higher reactivity compared with phenol and alkylated monophenols. As no kinetic data for the very slow, uncatalyzed phenol-formaldehyde reaction are available, and the present study deals with the uncatalyzed resorcinol-formaldehyde reaction only, a comparison between resorcinol and phenol in their kinetics was possible in only a few instances.

EFFECT OF DIFFERENT CATALYSTS ON THE POLYMERIZATION OF STYRENE R. N. Haward and W. Simpson. Trans. Faraday Soc. 47, 212-25 (Feb. 1951). The effect of different catalysts on the initial rate of polymerization of styrene was investigated at different temperatures and measurements made of the intrinsic viscosity of the polymers formed. The following catalysts were used: benzoyl peroxide, *tert*-butyl perbenzoate, *tert*-butyl peroxide, azo-bis (isobutyronitrile), *tert*-butyl hydroperoxide and di-azoaminobenzene. With the first four catalysts, it is found that the square of the polymerization rate is always proportional to the catalyst concentration. At 80° C. they all give approximately the same viscosity polymer where the rate of polymerization is the same. However, *tert*-butyl hydroperoxide, which also follows the same square relationship, gives much lower polymer viscosities, and this difference is ascribed to a chain transfer reaction. The intrinsic viscosities of polymers obtained in benzoyl peroxide catalyzed polymerization are compared with those predicted for the velocity constants of Bamford and Dewar. Approximate agreement is obtained both with regard to the observed viscosities and the way in which polymer viscosity against rate of polymerization curves vary with temperature. It is shown that the case of diazoaminobenzene is exceptional as it acts both as a catalyst and an inhibitor.

QUESTIONS YOU'VE ASKED MOST FREQUENTLY ABOUT WESTCHESTER

PEARLESCENT

CONCENTRATES

Q. Will Pearlescent Concentrates glamorize my product without increasing my costs?

A. They will! — experience proves it! You get faster turnover, new eye-appeal, the glamorized "custom-look." Yet you pay practically no more in manufacturing cost. Westchester Pearlescent Concentrates are priced for mass production.

Q. Is the use of Pearlescent Concentrates limited to any specific plastic?

A. No. We compound pearl crystals into any thermoplastic of your selection, such as polystyrene, cellulose acetate, cellulose acetate butyrate, methyl methacrylate, polyethylene, vinyl.

Q. Do I have to change my production methods?

A. No. Any operator can use Westchester Pearlescent Concentrates without special know-how or change in production routine. These Concentrates are heat stable, inert, won't chip or peel, non-corrosive, non-laminating. They do not interfere with normal extrusion rates, do not produce blemishes or blisters. Mixed by hand in the drying drawer, and fed into the molding press or extruding machine, they produce pearl results of amazing "true-to-life" brilliance.

Q. You say Pearlescent Concentrates help save on production costs. How?

A. When you use them with Westchester's revolutionary resin color concentrate, UNICOLOR, you do the entire job of colorizing and pearlizing in a single production run at low cost. Westchester's Pearlescent Concentrates are available in a wide range of pastel and matched colors for immediate delivery.

Q. How do you handle individualized specifications?

A. Westchester Plastics, Inc. are custom compounders. We can handle any special problem immediately and effectively. Send for the whole story today and samples of Westchester Pearlescent Concentrates!

WESTCHESTER PLASTICS

WESTCHESTER PLASTICS INC.

MAMARONECK, NEW YORK

Custom Compounders of Thermoplastic Materials

U. S. PLASTICS PATENTS

Copies of these patents are available from the U. S. Patent Office, Washington, D. C., at 25¢ each.

CYCLIC POLYMERS. R. K. Iler (to Du Pont). U.S. 2,547,944, Apr. 10. Cyclic polymeric organosilicates and methods of preparing.

POLYMERS. J. A. Bralley (to Goodrich). U.S. 2,548,141, Apr. 10. Polymers of halo-aryl allyl carbonates.

POLYMER SOLUTION. F. F. Miller (to Goodrich). U.S. 2,548,169, Apr. 10. A solution of polyvinylidene cyanide stabilized with a sulfur oxide.

INTERPOLYMERS. R. J. Wolf (to Goodrich). U.S. 2,548,186, Apr. 10. Interpolymers of an alkyl acrylate, an aromatic monoolefin, and a vinyl ester of an aromatic monocarboxylic acid.

POLYMERIZATION. C. H. Basdekis (to Monsanto). U.S. 2,548,282, Apr. 10. Polymerizing acrylonitrile in the presence of alkali metal soap of mahogany acids.

MOLDING. H. Z. Gora (to Cora-Lee). U.S. 2,548,306, Apr. 10. Method and apparatus for molding articles.

DISPERSIONS. F. H. Norris (to Monsanto). U.S. 2,548,318, Apr. 10. Process for preparing polystyrene dispersions.

POLYMERIZATION. L. M. Welch and H. L. Wilson (to Standard Oil Development). U.S. 2,548,415, Apr. 10. Boron fluoride in ethylidene fluoride for low temperature polymerization.

CONDENSATES. G. Barsky and F. A. Strauss. U.S. 2,548,416, Apr. 10. Amino-aldehyde condensates.

PLASTISOLS. D. X. Klein and M. N. Curgan (to Heyden). U.S. 2,548,433, Apr. 10. Plastisols containing nitrogenous viscosity controlling agents.

CELLULAR RESIN. J. R. McLoughlin (to Rohm and Haas). U.S. 2,548,438, Apr. 10. Heating acrylic resin to produce a cellular mass.

RESINS. E. C. Shokal and A. C. Mueller (to Shell Development). U.S. 2,548,447, Apr. 10. Resinifiable solution comprising a glycidyl polyether and a 1,2-epoxy mixed with a cyano-substituted hydrocarbon.

ISOOLEFIN POLYMERS. W. J. Sparks, D. W. Young and J. D. Garber (to Standard Oil Development). U.S. 2,548,503, Apr. 10. Preventing gelation during heating of resinous isoolefin polymers.

COPOLYMERS. T. A. TeGrotenhuis and G. H. Swart (to General Tire and Rubber). U.S. 2,548,504, Apr. 10. Copolymers of 3,4- or 3,5-dichloro-α-methyl-styrene with fluoroethylenes.

COPOLYMERS. R. E. Damschroder and J. W. Gates, Jr. (to Eastman). U.S. 2,548,520, Apr. 10. Heating a methacryl protein or the like with a vinyl monomer.

PHOTOPOLYMERIZATION. C. C. Sachs and J. Bond (to A. H. Kerr). U.S. 2,548,685, Apr. 10. Photopolymerization of an ethylenic compound in the presence of a carbonyl catalyst.

PRESSURE-SENSITIVE TAPE. W. Kellgren (to Minnesota Mining). U.S. 2,548,980, Apr. 17. Pressure-sensitive tape coated with a sizing layer of oil-modified resin and a tacky layer of a rubbery adhesive.

SURGICAL PACKAGE. C. C. Adams (to Davis and Geck). U.S. 2,549,039-40, Apr. 17. Thermoplastic heat-sealable envelope for surgical tape or sutures.

INSULATION. W. Koch (to Hercules). U.S. 2,549,101, Apr. 17. Insulation composition of ethyl cellulose, mineral oil, hydrogenated terphenyls, and polyvinyl butyral.

PAPER COATING. A. D. McLaren (to Du Pont). U.S. 2,549,220, Apr. 17. Priming a hydroxylated polymer sheet with a Werner complex with a carboxylic acido group and then coating with vinylidene chloride copolymer.

ION EXCHANGE. R. Kunin (to Rohm and Haas). U.S. 2,549,378, Apr. 17. Separating basic amino acids by means of carboxylic-type ion-exchange resin.

EXTRUSION. I. E. Tornberg. U.S. 2,549,400, Apr. 17. Extrusion apparatus for molding plastics.

STRUCTURAL UNIT. R. E. Parry (to Johns-Manville). U.S. 2,549,516, Apr. 17. Vinyl chloride-acetate copolymer coating for hydraulic cement surfaces.

COPOLYMERS. W. J. Sparks and D. W. Young (to Standard Oil). U.S. 2,549,539, Apr. 17. Copolymers of styrene and 2-methyl pentadiene.

FLUORINATED OLEFINS. G. H. Denison, Jr. and A. Goldschmidt (to Calif. Research). U.S. 2,549,580, Apr. 17. Liquid polymers of fluorinated olefins.

POLYESTER RESIN. W. I. Weaver (to Libbey-Owens-Ford). U.S. 2,549,732, Apr. 17. Polymerizable polyhydric-alcohol polycarboxylic-acid polyester and fibers of crystalline anhydrous silicates.

ION EXCHANGE. F. A. Hessel and W. B. Canfield (to Montclair Research and Ellis-Foster). U.S. 2,549,745, Apr. 17. Cation-exchange resin comprising reaction product of sulfuric acid and wallaba resin or reaction product thereof with an aldehyde.

INTERPOLYMER. E. G. Bobalek (to Arco). U.S. 2,549,767, Apr. 24. Interpolymer of monovinyl aromatic polymer, drying oil or acid, polyhydric alcohol and polybasic acid.

POLYMER. E. A. H. Friedheim. U.S. 2,549,795, Apr. 24. Homo-polymerization of antimony compounds derived from 1,3,5-triazine.

COPOLYMER. M. R. Lytton (to American Viscose). U.S. 2,549,913, Apr. 24. Copolymer of acrylonitrile and isobutene.

POLYMERIZATION. S. A. Mosley (to Carbide and Carbon). U.S. 2,549,921, Apr. 24. Polymerization of vinyl alkyl ethers with aluminum hexa-hydrosulfate.

POLYMERS. J. C. Sauer (to Du Pont). U.S. 2,549,935, Apr. 24. Polymers of hexafluoroprene.

TITANIUM COMPOUNDS. F. K. Signaigo (to Du Pont). U.S. 2,549,940, Apr. 24. Titanating polyvinyl resins.

POLYMERIZATION. W. W. Crouch and E. G. Marhofer (to Phillips Pe-

Makes good merchandise sell better...

Kodapak Sheet

"Kodapak" is a trade-mark

Tough, transparent Kodapak Sheet works wonders for textiles. Used to pre-package towels and washcloths, for example, it keeps sets intact—fresh and clean on counter or shelf. Details of weave, pattern and color "sing out" and sell.

Due to essential government orders . . . together with critical shortages of basic materials, current supply of Kodapak Sheet is necessarily limited. In your planning please consult your local representative or write

Cellulose Products Division, Eastman Kodak Company, Rochester 4, N.Y.

Sales offices in New York, Chicago, Dallas. Pacific Coast distributor: Wilson & Geo. Meyer & Co., San Francisco, Los Angeles, Portland, Seattle. Canadian distributor: Paper Sales Limited, Toronto, Montreal.

Towels and washcloths: courtesy of Jos. McCutcheon & Company, N.Y.

PHENOPREG MATERIALS

for LAMINATING and MOLDING
high pressure • low pressure

INDUSTRIAL PHENOPREG materials include a variety of impregnated grades particularly suited for use in the manufacture of industrial laminates. They include all types of fillers, such as papers, fabrics, Fiberglas mat and glass cloth impregnated with selected phenolic, melamine, and specialty type resins.

There are Phenopreg materials available for all NEMA grade laminates, as well as a variety of grades tailored specifically for special applications or molding conditions.

Phenopreg materials are being used successfully for filter media, various types of helmets, rolled tubing, laminates requiring electrical, chemical resistant, or mechanical properties, and a variety of other applications.

We invite your inquiries about standard and special grades of Phenopreg materials. Ask for a sales engineer to assist with your technical problems.

FABRICON PRODUCTS, INC.
PLASTICS DIVISION

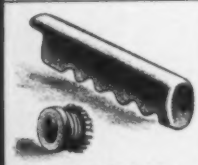
Main Office 1721 Pleasant Ave. • River Route 18, Mich. • Vinewood 1-8200
Manufacturing Plants: River Rouge, Los Angeles • Sales Offices: New York, Chicago
Canadian Representative: Plastic Supply Company, Montreal, Toronto

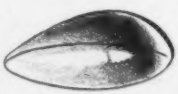
ANY FABRICATION JOB
any plastic material
see CRYSTAL PLASTICS

Plastic Balls
up to 2" diam.

Centerless Grinding
of all plastics

Thread Tapping
accurate, high speed


Precision Machining
to specifications


Vacuum Forming
of acrylic plastics

Die Cutting
and assembly

for all your requirements, call
CRYSTAL PLASTICS, INC.
232-252 Taaffe Place, Brooklyn 5, N. Y. • Phone: ST 9-4002-4

troleum). U.S. 2,549,961-2, Apr. 24. Use of blends of mercaptans in emulsion polymerization.

COPOLYMERS. W. H. Daudt (to Corning Glass). U.S. 2,550,003, Apr. 24. Copolymerization of organosiloxanes.

LAMINATES. H. Dreyfus (to Celanese). U.S. 2,550,006, Apr. 24. Interposing tri(monochloroethyl) phosphate between layers of cellulose acetate fabric and laminating with a high frequency field.

COPOLYMERS. N. C. Foster (to Westinghouse). U.S. 2,550,114, Apr. 24. Copolymers of castor oil, unsaturated dicarboxylic acid reaction products, and polymerizable vinyl compounds.

POLYMER BLENDS. L. E. Daly (to U. S. Rubber). U.S. 2,550,139, Apr. 24. Blends of butadiene-acrylonitrile and hard styrene-acrylonitrile copolymers.

CONSTRUCTION BOARD. E. Eger (to U. S. Rubber). U.S. 2,550,143, Apr. 24. Fibrous board bonded with resorcinol resin and a compatible thermoplastic.

SILOXANES. J. L. Speier, Jr. (to Dow Corning). U.S. 2,550,205, Apr. 24. Acyloxymethyl-substituted siloxanes.

EXTRUSION. R. Colombo. U.S. 2,550,226, Apr. 24. Extrusion press for plastic molding.

BITUMINOUS COMPOSITION. M. Naps and H. J. Sommer (to Shell Development). U. S. 2,550,371, Apr. 24. Aqueous dispersion of an asphaltic material and α-methyl acrylonitrile.

INSULATION. F. T. Gorski (to Owens-Corning Fiberglas). U.S. 2,550,465, Apr. 24. A mass of glass fibers bonded with thermoset resin and impregnated with thermoplastic resin.

POLYVINYL RESINS. N. Turnbull (to Du Pont). U.S. 2,550,503, Apr. 24. Applying resin derivatives to granular polyvinyl carboxylate.

TERPENE RESIN. B. L. Hampton (to Crosby Chemicals). U.S. 2,550,557, Apr. 24. Decolorizing cyclic terpene polymers by treating with selenium.

LEATHER TREATMENT. W. O. Dawson (to American Cyanamid). U.S. 2,550,638-9, Apr. 24. Bleaching and filling leather with amino carboxylic

Miccrosol

A superior Vinyl Plastisol developed and manufactured to your specifications by MICHIGAN CHROME & CHEMICAL COMPANY.

MICCROSOL is specially formulated for a wide variety of coating applications as molding, dipping, etc. It is ideal for slush molding of toys and other suitable flexible objects; as well as a coating material for gloves, fabric, wire goods and packaging protection.

Our engineers will be glad to help you with your molding or coating applications. Write for consultation on your problem.

MICHIGAN CHROME & CHEMICAL COMPANY

6342 East Jefferson Avenue
Detroit 7, Michigan

MICCRO Products

---

from Attic fans **timing devices for every purpose** to X-ray machines

MARK-TIME does the job first where quality counts

In every industrial and appliance field Mark-Time timing devices are known for rugged, dependable operation with no sacrifice of accuracy.

Mark-Time timing devices are designed, engineered, and manufactured by a skilled team of engineers and craftsmen. They include spring operated ball timers, time switches, and combinations of both, designed to meet all specifications and requirements where audible bell signal or electrical circuit breaking is required at the end of a time cycle.

Let Mark-Time solve your timing problem!

MARK-TIME **M. H. RHODES, INC.**
HARTFORD CONNECTICUT

In Canada send inquiries to: Ontario Hughes Owens Co, Ottawa, Ontario

---

SOME OF ITS MANY USES IN *Plastics Laboratories*

Testing single-cavity molds
Molding color samples.
Production of samples.
Plastics instruction and demonstration.
Metallographic mounting.
Metal insert mold tests.
Vulcanizing.
Drawing.
Forming.
Embossing.
Bonding plywood.
Testing tensile properties.
Testing compressive properties.
Testing shear strength.
Flow tests.
Crushing tests.
Breaking tests.
Determining heat cycles.

THE CARVER LABORATORY PRESS

the Standard Press of Many Uses...
...complete with Accessories for General Research
Some of the Many General Applications...continued
...for Quick—Accurate—Small Scale Tests

Send for Complete New Catalog

Send for your copy of this new handy-size manual containing up-to-date information on the Carver Laboratory Press and its many uses.

FRED S. CARVER INC.
HYDRAULIC EQUIPMENT
343 HUDSON ST., NEW YORK 14, N. Y.

Send catalog, describing Carver Laboratory Press and Standard Accessories.

NAME .....
FIRM .....
ADDRESS 61

You can turn out 20 to 60 perfectly-deflashed circular or cylindrical moldings every minute with . . .

The New NASH "103"

AUTOMATIC FLASH LATHE

Hand flash removal slows down production and adds to the cost of your moldings. The Nash "103" lathe pays for itself quickly with *more and better work at lower cost per minute.*

BUILT THE NASH WAY THROUGHOUT

The Nash "103" confines its operation to the flash area exclusively, maintaining the surface appearance of molded pieces. It has 10 spindles and can deflash moldings up to 4½" diameter when all spindles are used, and up to 6" diameter when alternate spindles are employed. Height adjustments vary from nothing to 8". All necessary adjustments of spindle speeds and heights are easily made.

Write for further details. We also build the Nash "116" Rotary Edger for Plastic Dinnerware.

SPECIAL FINISHING MACHINES · SINCE 1890 · NASH

J. M. NASH COMPANY

Dept. 103 2370 No. 30th St. Milwaukee 10, Wisconsin

acid or amino-sulfanic acid-methylol melamine resin.

NYLON. O. M. Arnold. U.S. 2,550,650, Apr. 24. Treating waste nylon fibers with polystyrene and heating and pressing into a molten mass.

DIALLYL CYANAMIDE. E. K. Drechsel and J. J. Padbury (to American Cyanamid). U.S. 2,550,652, Apr. 24. Polymerizable compositions of diallyl cyanamid and copolymerizable substances.

COATING. L. B. Falkenburg, A. J. Lewis, and L. C. Cowan (to U. S.). U.S. 2,550,682, May 1. Coating of a polyamide dissolved in alcohol.

POLYMERIZATION. J. C. Hillyer and J. F. Wilson (to Phillips Petroleum). U.S. 2,550,695, May 1. Hydrogen fluoride as catalyst for diolefin polymerization.

RESINS. G. D. Martin (to Publicker). U.S. 2,550,706, May 1. Modified alkyd resins from 4-cyclohexane-1,2-dicarboxylic acid.

RESINS. H. P. Wohnsiedler and J. F. Blais (to American Cyanamid). U.S. 2,550,746-7, May 1. Thermosetting compositions of an amino-plast and an alkyl amidine or a cyclic alkyl amidine.

POLYMERS. G. D. Buckley and N. H. Ray (to I. C. I.). U.S. 2,550,767, May 1. Polymer prepared by reacting a polyamine with carbon dioxide.

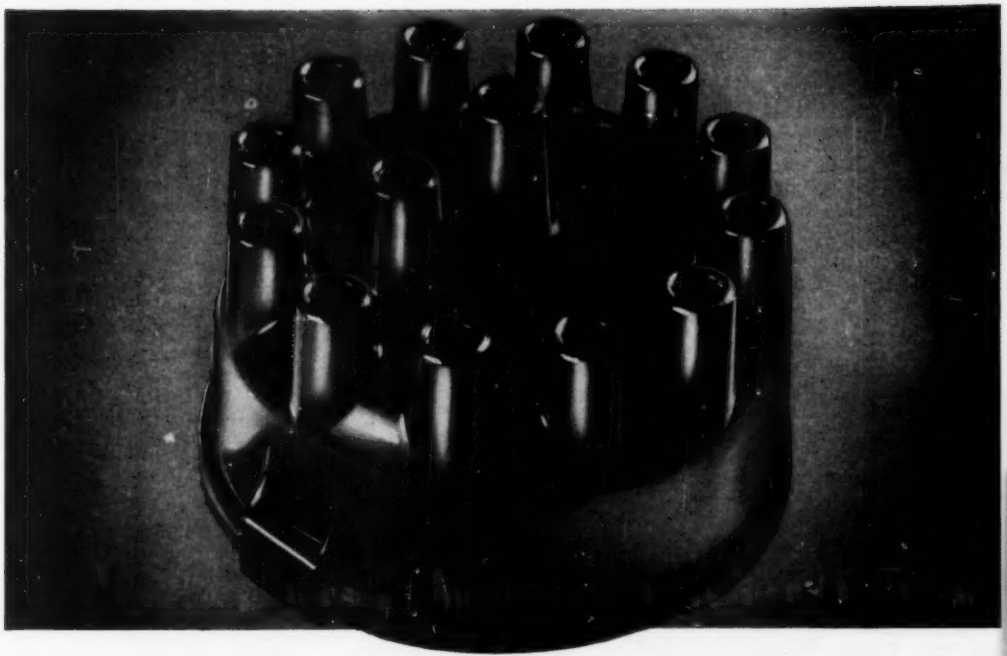
SHEET TREATMENT. R. D. Johnson (to B. F. Goodrich). U.S. 2,551,005, May 1. Continuous heat treatment of thermoplastic sheet.

COATING. E. W. Balis and H. A. Liebhafsky (to General Electric). U.S. 2,551,232, May 1. Coating with an alkyd resin, treating with an organohalosilane until non-tacky, and curing.

COATINGS. L. B. Palmer and R. W. Charlton (to Congoleum-Nairn). U.S. 2,551,282, May 1. Coating from liquid anacardic material and polyvinyl butyral.

INTERPOLYMERS. P. O. Tawney (to U. S. Rubber). U.S. 2,551,352-3, May 1. Interpolymers of castor oil maleate.

RESINS. E. W. Moffett and W. K. Hoya (to Pittsburgh Plate Glass). U.S. 2,551,387, May 1. Esters of unsaturated fatty acids and glycol ethers in copolymers of cyclopentadiene and unsaturated glyceride oils.



HOW TO BEAT THE HEAT IN A PHENOLIC MOLDING

Use Borden's DURITE.

The heat transferred to the distributor cap shown above sometimes raises its temperature to 250 deg. But this cap can take it. In that heat, it not only maintains its high dielectric strength, but also its flexibility and its remarkable resistance to oils, water and solvents.

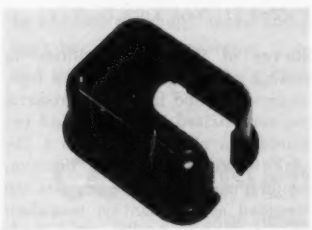
The extraordinary *combination* of such serviceable qualities is obtained in Borden's DURITE HR-300. With DURITE HR-300, you can produce more parts, too. Its low, economical specific gravity of 1.39 makes for easier handling and moldability.

You can depend on all of Borden's DURITE compounds for the special properties you need. These compounds are made by the skillful application of cellulosic, carbonaceous, and mineral fillers to a resin base.

Address all your phenolic molding problems to The Borden Company, Chemical Division, Dept. MP-81, 350 Madison Ave., New York 17, N. Y.

Borden's DURITE

Molding Powders • Bonding Resins • Cements



Smooth, black finish; good general strength and dielectric properties — provided by the Borden's DURITE phenolic for this switchbox.

Good finish; resistance to heat conductivity; adequate dielectric strength — all provided by the Borden's DURITE phenolic for this appliance plug.

Lustrous finish; good general strength and dielectric properties — provided by the Borden's DURITE phenolic for this switch handle.

BOOKS AND BOOKLETS

Write for these publications to the companies listed. Unless otherwise specified, they will be sent gratis to executives who request them on business stationery.

"Australian Plastics Year Book 1950"

Published in 1951 by Australian Trade Publications Pty. Ltd., Box 4677, G.P.O., Sydney, Australia. Price 15 shillings.

The sixth edition of this annual volume includes an alphabetical list of all companies connected with the plastics industry; materials, machinery, and equipment suppliers; chemical suppliers; custom molders, fabricators, and finishers; plastics consultants; proprietary names applicable to manufactured products, materials, and equipment; and who's who in Australian plastics.

"The New Fibers" by Joseph V. and Signe Lidfeldt Sherman

Published in 1950 by D. Van Nostrand Co., Inc., 250 Fourth Ave., New York 3, N. Y. 531 pages. Price $6.00.

The history and development, methods of manufacture, properties, applications, patents, and future prospects of the new fibers that have been brought out in the past 10 years are covered. Among these fibers are nylon, vinyl resin, vinylidene chloride, glass, polyethylene, protein, and the newer rayon and cellulosics. Tables, graphs, charts and process diagrams are included; photographs show actual operations.

"The Chemical Formulary, Vol. IX" edited by H. Bennett

Published in 1951 by The Chemical Publishing Co., Inc., 26 Court St., Brooklyn 2, N. Y. 648 pages. Price $7.00.

This ninth volume in a series is a collection of new, up-to-date industrial formulae. Every formula included in this volume is different from those of the previous volumes and represents the newest developments in each field covered. The main purpose of this compilation of data by a long roster of contributing editors is to ease the task of chemists who may find themselves on strange ground with unfamiliar mixtures, blends, or compounds. The book is divided into 20 chapters covering such topics as adhesives, ceramics, colloids, plastics, resins, and textiles. An alphabetical list of chemicals and trade mark products with the names of their manufacturers is included as a guide in buying chemicals for specific formulation requirements.

"British Plastics Year Book 1951"

Published in 1951 by Iliffe & Sons Ltd., Dorset House, Stamford St., London, S.E. 1, England. 435 pages. Price 30 shillings.

Paralleling the ever expanding plastics industry, the 21st edition of this authoritative British annual has been increased in size and has been brought up to date. The 10 sections of the book make up a comprehensive buyer's guide to the British plastics industry. These sections cover materials used in the plastics industry; manufactured products; plants and equipment; technical and general glossaries; names and addresses; who's who in the industry; associations and federations; technical and general data; and an editorial section on patents and British standard specifications.

"OPD Record of Prices on Chemicals and Related Materials"

Published in 1951 by Schnell Publishing Co., Inc., 30 Church St., New York 7, N. Y. 244 pages. Price $6.25.

Compiled from more than a million price quotations reported in the weekly issues of *Oil, Paint, and Drug Reporter* over the past four years, this new volume is a record of price behavior. Its scope covers all the commercially known agricultural chemicals; botanical drugs; coal tar chemicals; fine chemicals; drugs; aromatics; heavy chemicals; oils, fats, and waxes; and textile and leather chemicals.

"Aminoplastics" by C. P. Vale

Published by Interscience Publishers, Inc., 250 Fifth Ave., New York 1, N. Y. 238 pages. Price $2.75.

This illustrated book on the characteristics and uses of amino resins, collates the technical literature relating to the chemistry of the amino resins and surveys their uses and applications in various industries. Considered are formation of urea-formaldehyde and melamine resins, uses of molding powders, properties and testing of moldings, and use of aminoplastics for lacquers, adhesives, papers, textiles, and other purposes. Synthetic resinous products are the prime concern of the book, which is useful as a reference work to those engaged in the aminoplastics industry, to lecturers and students, and also to plywood, textile, and paper mills which use amino resins.

Safety Manuals—Four new booklets on safety in the plant, home, and on the highway, designed for distribution by plant foremen or as payroll enclosures, have just been issued by this organization. "Aren't People Funny?" points up the human foibles that cause many accidents; "K. O. Dirt and Disorder" considers the advantages of working in a clean and orderly place; "Cry Whoa!" discusses motor vehicle accidents, and "Safety 'Round the Clock" deals with home safety. *National Safety Council, 425 N. Michigan Ave., Chicago 11, Ill.*

Practical factors in nitrogen packing using flexible film—Defining the major requirements of successful commercial nitrogen-packing of foods in flexible film containers, this booklet is a reprint of a paper delivered before a Packaging Institute Forum. Information gained from laboratory and plant tests is the basis of an outline of requirements which must be met for effective nitrogen packing of foods. The booklet also discusses methods which can be used to check the suitability of a film for use in nitrogen packaging, and describes an instrument and method for checking package closures on the line. *Linde Air Products Co., Div. of Union Carbide and Carbon Corp., 30 E. 42nd St., New York 17, N. Y.*

Survey of industrial facilities—A leading manufacturer of plastic toys, housewares, and industrial products has summarized its growth and research and plant facilities in a 24-page booklet. The firm's injection molding machines and extruders are classified as to quantity, manufacture, and size; facilities for slush molding vinyl plastics are listed. Other equipment listed and illustrated includes heat sealing facilities;

Drums—"Hard to Beat"

The same Continental fibre drums that serve industry so well are giving an equally good accounting of themselves in military service.

Continental drums give extra protection to dangerous, expensive or hard-to-handle articles for shipment anywhere. Their light tare weight cuts shipping costs. They load compactly and ride safely. The closures are tight and strong, but easy to open and close.

In addition to being rugged and durable, these drums can't be beat for appearance. They are neat and trim and feature quality printing or spray painting.

1. The famous Continental LEVERPAK drum with its unique lever-locking device gives maximum protection under hard usage. 12- to 75-gallon sizes.
2. Continental FIBERPAK drum... a rigid, all-fibre container in ¾- to 67-gallon sizes.
3. Continental STAPAK drum. Has fibre body with metal top and bottom. Supplied in 2- to 35-gallon sizes.
4. Continental UPAK drum. Custom-made for the shipment of rolled materials.

CONTINENTAL CAN COMPANY

FIBRE DRUM DIVISION — VAN WERT, OHIO

NEW YORK • PHILADELPHIA • PITTSBURGH • TONAWANDA • CLEVELAND
CHICAGO • SAN FRANCISCO • ST. LOUIS • LOS ANGELES • EAU CLAIRE

generators and presses; machine shop equipment; a jig borer; duplicators and engraving machines; grinders; milling machines; drill presses; lathes; metal cutting saws; and die casting equipment. *Ideal Plastics Corp., Div. of Ideal Toy Corp., 184-10 Jamaica Ave., Hollis 7, N. Y.*

Protecting screw threads—Design data on helical-wire thread inserts and the use of these inserts in the protection and repair of tapped holes is contained in this 16-page bulletin. The publication explains how the inserts are used as original manufacturing components to protect tapped threads in plastics, metal, and wood against stripping, wear, and corrosion. The use of the screw thread inserts in production salvage and maintenance operations is also covered. Tables give basic insert lengths, recommended drill sizes, roughing and finishing-tap specifications, and thread gages. *Heli-Coil Corp., 47-23 35th St., Long Island City 1, N. Y.*

Chemical-resistant plastic equipment—Complete engineering data on tubing, pipe, valves, and fittings made of Ace-Saran and Ace-Parian (polyethylene) plastics are contained in this 16-page bulletin. The materials are light in weight, tough, and have high impact strength. Their properties and resistance to most common chemicals are summarized in a table. Information on bursting and working pressures is given, along with suggestions on the fabrication of complete piping systems from these new plastics. Standard sizes and weights are listed. *American Hard Rubber Co., 11 Mercer St., New York 13, N. Y.*

Resins for adhesives—Three broad types of adhesives—rubber, cellulosics, and water soluble—are cited in this 18-page booklet to show their contributions to film cohesion, surface tack, bond strength, and other properties. These examples are also an aid to the formulator in selecting a resin for use in a specific adhesive, and indicate the broad range of hardness types which are available. *Hercules Powder Co., Wilmington, Del.*

From plans to plastics—Complete facilities for engineering, research, and development in plastics are described and illustrated in this 28-page folder. One section, covering thermosetting plastics, pictures equipment and finished products; another part deals with molding thermoplastics. In addition, facilities are discussed for finishing molded parts; reinforced low pressure molding; and acrylic sheet forming. The booklet illustrates the end products made from industrial and decorative Conolite, the firm's reinforced laminated plastic. *Continental Can Co., Plastics Div., Cambridge, Ohio.*

Low cost testing machines (Bull. 40)—Hydraulic testing machines for tension, compression, transverse, and flexure testing are fully described in an eight-page booklet. The equipment, which comprises the company's new Super "L" line, is available in capacities of 60,000; 120,000; 200,000; 300,000; and 400,000 pounds. Detailed data cover the electronic Selecto-range indicating system, which provides a 50 to 1 spread of testing ranges on one 28-in. dial, ability to change from one range to another during test without changing rate of loading, and an automatically illuminated load range indicator. Also included is information on the Electronic Recorder which provides 100 to 1 spread of ranges; and suggested tools for use with the machines. *Tinius Olsen Testing Machine Co., 1068 Easton Rd., Willow Grove, Pa.*

Commercial laboratories—The 1951 list of members of this organization is contained in an eight-page booklet. The group is comprised of 58 independent testing, research, and inspection laboratories and 80 branches located in the chief metropolitan centers of the country. Council members employ chemists, engineers, metallurgists, and technicians covering practically all phases of industrial need. *American Council of Commercial Laboratories, Inc., 4302 East-West Highway, Washington 14, D. C.*

Dihydroxy diphenyl sulfone—Typical reactions of dihydroxy diphenyl sulfone are described in this eight-page data sheet. The bulletin contains information on two forms of mixed isomers of the chemical available in commercial quantities, and two purified isomers which can be supplied in experimental amounts. Suggested uses for the sulfone or its reaction products include an electroplating bath additive, tanning agent resins, a stabilizer for cellulose materials, and adhesive formulations. *Merrimac Div., Monsanto Chemical Co., Everett, Mass.*

Plexiglas—Proper techniques for fabricating, forming, cementing, and annealing Plexiglas and Plexiglas II, along with data on physical properties and design stress are outlined in Bulletins 66a, 7a, and 10. Included is a table of recommended minimum oven temperatures for heating Plexiglas II for various types of forming. A section on cementing has been expanded to emphasize the necessity for proper annealing of Plexiglas II, both before and after cementing. Schematic drawings supplement the text. *Rohm & Haas Co., Washington Sq., Philadelphia 5, Pa.*

Vinyl acetate resins—Latest data available on forms, properties, and applications for Vinylite brand acetate resins are compiled as a technical reference source in this 28-page booklet. Tables and graphs provide essential information on solution viscosity, toughness, film strength, compatibility, and softening temperature for each type of vinyl acetate resin. Under separate headings, acetate resins, alcohol-acetate resin solutions, and acetate resin dispersions are discussed, with particular reference to their inherent qualities as bonding agents. Detailed information is also included on the preparation of these resins for adhesives and other commercial uses such as paper coatings and metallic inks and lacquers. *Bakelite Co., Div. of Union Carbide and Carbon Corp., 300 Madison Ave., New York 17, N.Y.*

End mills for all purposes—Complete listings for over 500 types and sizes of end mills and related tools, including a number of new items, are contained in this catalogue. A section on end mill technical data presents terminology, tips, and reference material on feeds, speeds, coolants, sharpening, inspection, etc. *Pratt & Whitney, Div. Niles-Bement-Pond Co., West Hartford, Conn.*

Liquefied gases—The production, handling, and storage of liquefied gases are summarized in this new

(*Continued on p. 145*)

Send for your copy

NEW BARRETT RELEASE

Gives Typical Plastisol Formulations

BARRETT CHEMICALS
for the
PLASTICS INDUSTRY

"ELASTEX" 10-P Plasticizer
"ELASTEX" 28-P Plasticizer
"ELASTEX" "50-B" Plasticizer
"ELASTEX" DCHP Plasticizer
Dibutyl Phthalate
Phthalic Anhydride
Phenol
Crystal Urea

*Reg. U. S. Pat. Off.

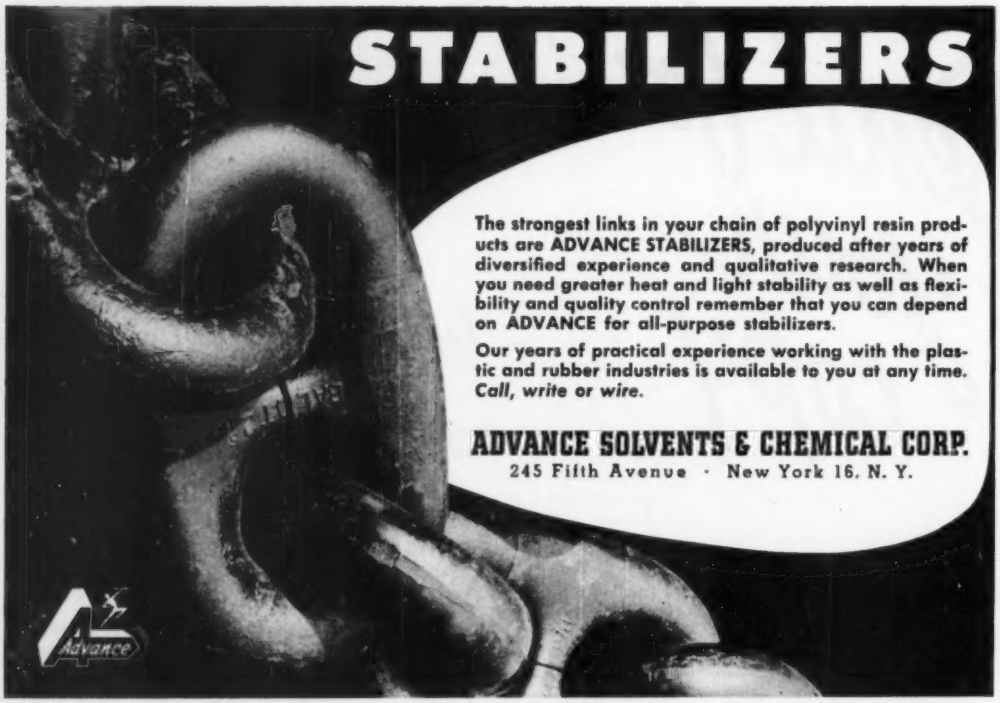
In formulating a plastisol, the choice of plasticizer is especially important. This is because the plasticizer is the sole vehicle for the resin, and affects the viscosity of the dispersion as well as the flexibility, volatility and color of the finished article.

Typical plastisol formulations employing Barrett ELASTEX* 10-P Plasticizer, Barrett "ELASTEX" 28-P Plasticizer and Barrett "ELASTEX" 50-B* Plasticizer have been incorporated in a new Barrett technical release. Send for your copy.

THE BARRETT DIVISION
ALLIED CHEMICAL & DYE CORPORATION
40 Rector Street, New York 6, N. Y.
In Canada: The Barrett Company, Ltd.
5551 St. Hubert Street, Montreal, Que.

Barrett

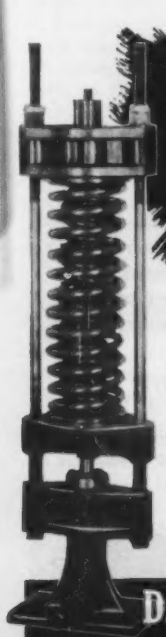
STABILIZERS



The strongest links in your chain of polyvinyl resin products are ADVANCE STABILIZERS, produced after years of diversified experience and qualitative research. When you need greater heat and light stability as well as flexibility and quality control remember that you can depend on ADVANCE for all-purpose stabilizers.

Our years of practical experience working with the plastic and rubber industries is available to you at any time. *Call, write or wire.*

ADVANCE SOLVENTS & CHEMICAL CORP.
245 Fifth Avenue · New York 16, N. Y.



PROTECT Hydraulic Systems from SHOCK

Keep the shock of a quick-closing valve from pounding your hydraulic system to pieces. Avoid unnecessary leaks. Cushion the blow with a Dunning & Boschert Shock Alleviator.

Loosely coiled, nested springs allow a full eight-inch piston travel. Steel tube inside the inner spring prevents buckling. Moving platen is guided by strain rods which are threaded to permit easy adjustment of pressure. Steel cylinder; bronze gland; 2-in. stainless-steel piston.

Here's a sound investment in longer service life — lower maintenance costs. Write for complete information.

Dunning & Boschert
PRESS CO., INC.
331 W. WATER ST., SYRACUSE 4, N. Y.

ALEXANDER
PANTOGRAPH ENGRAVING & DIE-SINKING MACHINES
FOR 2 OR 3 DIMENSIONAL WORK

Will Produce . . .
Minute Details
Fine Finishes
Exacting Tolerances

Increased Capacities
Minimum Ratio 1:1.5;
Maximum Ratio 1:10
Fine or Coarse Feed Adjustments

SPINDLES, CUTTERS, ATTACHMENTS, CUTTER GRINDERS AND SPARE PARTS, NOW CARRIED IN NEW YORK STOCK FOR IMMEDIATE DELIVERY.

Write for Complete Catalog

J. ARTHUR DEAKIN & SON
150-28 Hillside Ave. Jamaica 2, New York, N.Y.
Midwest Rep.: L. A. Zocchi, 615 W. Randolph St., Chicago 6, Ill.

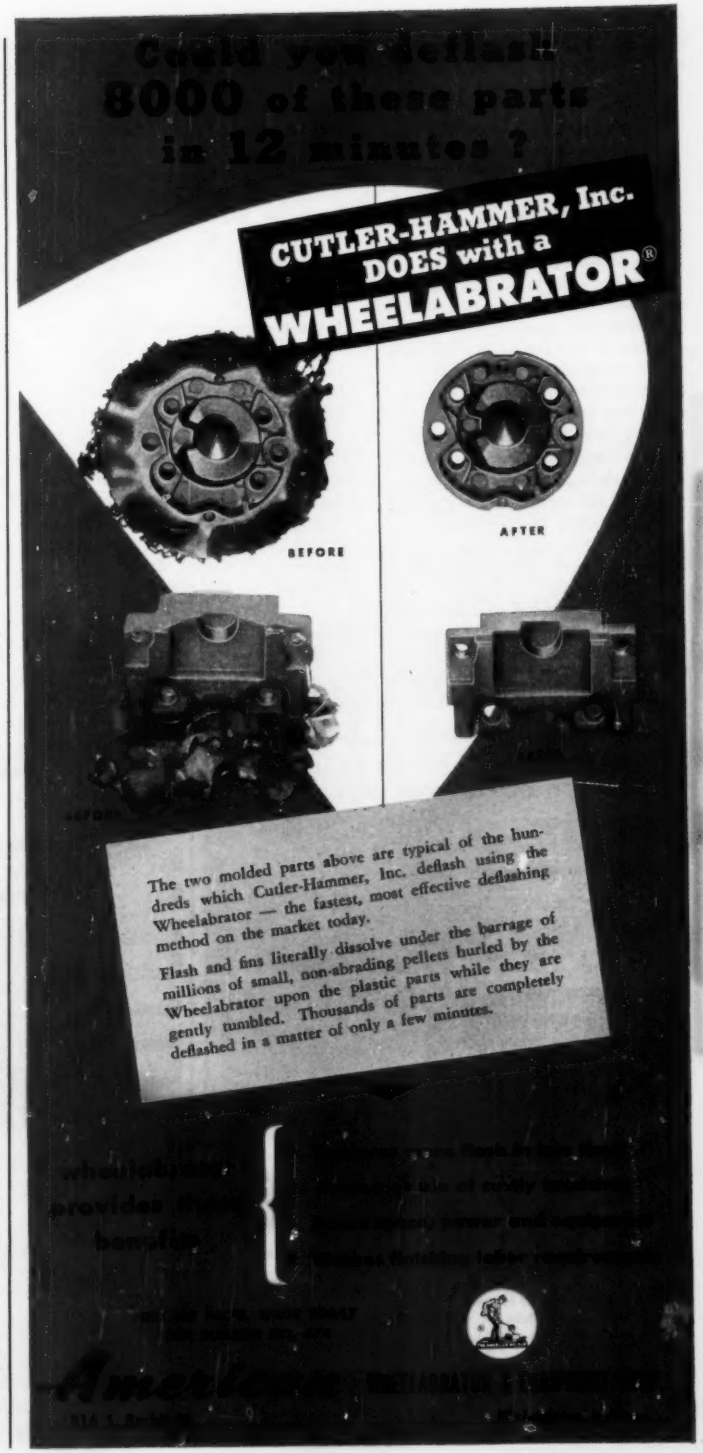
booklet. Included are brief descriptions of the ADL Collins helium Cryostat, hydrogen liquefier, liquid oxygen generator, helium refrigerator, and liquid-oxygen pump. All are applicable to work with liquefied gases or to low temperature investigations. A review of all engineering services of the company is also included. *Mechanical Div., Arthur D. Little, Inc., 30 Memorial Drive, Cambridge 42, Mass.*

A century of hydraulic equipment manufacture—In celebration of 100 years of service in the field of hydraulic equipment, this firm has published a 16-page chronicle of its growth and development with a pictorial account of the construction of hydraulic presses within the plant. *American Steel Foundries, Elmes Engineering Div., Cincinnati, Ohio.*

Hycar-phenolic compounds—How a new series of Hycar-phenolic compounds (wood flour-filled, asbestos-filled, flock-filled, and fabric-filled) can aid molders in improving products and opening new markets is set forth in a brochure. The literature describes advantages to be gained by using the materials and compares the performance of the new series with that of other phenolics. *Chemical Dept., General Electric Co., Pittsfield, Mass.*

A to Zero in refrigeration—Tracing the development of refrigeration from the early Chinese, Greeks, and Romans, when natural ice and snow were stored in pits, to the production of artificial ice in the middle of the 19th century, this 93-page booklet describes in non-technical terms how the modern electrical refrigerator works. The functions of the freezer, compressor, and condenser are outlined; gas refrigeration and air conditioning equipment is described. Available for educational use from *General Motors Corp., 1775 Broadway, New York 19, N. Y.*

Mobilizing production for national defense—Panel members of the American Management Association discuss different facets of the program for the mobilization of production now being planned and carried out. Many of these plans were not frozen at the time of publication, and since the program is necessarily a living and growing one, the ques-


Could you deflash 8000 of these parts in 12 minutes?
CUTLER-HAMMER, Inc. DOES with a WHEELABRATOR®
BEFORE
AFTER
The two molded parts above are typical of the hundreds which Cutler-Hammer, Inc. deflash using the Wheelabrator — the fastest, most effective deflashing method on the market today.
Flash and fins literally dissolve under the barrage of millions of small, non-abrading pellets hurled by the Wheelabrator upon the plastic parts while they are gently tumbled. Thousands of parts are completely deflashed in a matter of only a few minutes.

tions and the thinking of all participants in this discussion may well play a vital part in their formulation and modification. Available to members for $1.00 and to non-members for $1.25 from *American Management Association, 330 West 42nd St., New York 18, N. Y.*

Tool catalog in Spanish—Amertool Services, Inc., a cooperative organization of 14 American machine tool firms formed to serve Latin-American industry, has published an official catalog in Spanish. The avowed purpose of the enterprise, as stated in the publication, is to assure adequate technical assistance to Latin-American engineers and to provide credit facilities. Photographs, sketches, and specifications of available equipment accompany text describing the operation of a wide variety of units. *The Cincinnati Milling Machine Co., Marburg Ave. & Klein St., Cincinnati 9, Ohio.*

Facts about molded and laminated plastics—Plastics are explained in non-technical language in a 24-page booklet designed to provide a basic introduction to the many types of plastics in use, various methods of production, and applications in industrial and consumer products. Also presented are: a history of plastics; advantages and limitations; thermosetting and thermoplastic types; design suggestions; and comparative properties of different grades. Included are a listing of products, services, and facilities offered by the company. *The Richardson Co., 2764 Lake St., Melrose Park, Ill.*

Inspection apparatus—Optical and illuminating equipment for inspection jobs are described and illustrated in an eight-page brochure. Devices are available for applications ranging from naked-eye inspection to high-power, close-tolerance microscopic examinations. Instruments are provided for black light, fluorescent, and inaccessible "around-the-corner" inspections. *Arthur S. La Pine & Co., 121 W. Hubbard St., Chicago 10, Ill.*

Power units—A new line of J. I. C. hydraulic power units constructed in accordance with recommended J. I. C. Hydraulic Standards for Industrial Equipment is described in a leaflet containing diagrammatic sketches of the new equipment and accompanied by a specification sheet. The new power units are available in three series—T20, T30, and T60, and in 10 models for electric motors ranging from ¾ to 25 hp. Single, double, and two-pressure pumps are used for 1000-p.s.i. service, while two-stage pumps are utilized for 2000-p.s.i. service. *Industrial Products, Vickers Inc., 1446 Oakman Blvd., Detroit 32, Mich.*

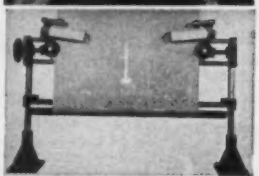
Phenolic resins—An eight-page brochure and a broadside present features, production advantages, and size specifications relating to Marblette cast and liquid phenolic resins. The brochure includes an illustrated section on the machining characteristics of cast resins. Color is emphasized in the broadside entitled "Key to Beauty for Your Products," which contains actual sample disks of cast phenolic resin material. Both pieces of literature outline the firm's design and engineering services available for consultation on plant problems. *The Marblette Corp., 37-21 Thirtieth St., Long Island City, 1, N.Y.*

STOP FAULTY FEEDING
BEFORE IT EATS UP YOUR PROFITS . . .

Mount Hope FREE WHEELING EXPANDER

Removes wrinkles and creases *before* entering next machine. Holds to full width all tire-cord paper, rubber and plastic films and all types of fabrics.

Mount Hope PRECISION GUIDER



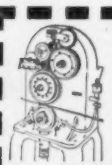
Positive but gentle control—fully automatic. Maintains accurate lateral alignment on all types of material from heavy sheeting to delicate films.

OTHER MOUNT HOPE FILM AND CLOTH HANDLING DEVICES

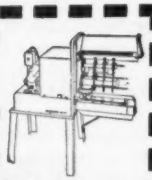
1. Mount Hope Open Width Tension Device . . . Controls Tension.
2. Mount Hope Skewed Weft Straightener . . . Sets Weft at Right Angles to Warp.
3. Mount Hope Bowed Weft Straightener . . . takes the curve out of bowed filling.
4. Mount Hope Continuous Roll Feed . . . Permits Sewing on Fresh Roll at Full Machine Speed.
5. Mount Hope Plaiter . . . Ball Bearings—Neoprene covered draw rolls.

Write Dept. M.

MOUNT HOPE MACHINERY CO.
15 Fifth Street, Taunton, Massachusetts



INKS AND MACHINES

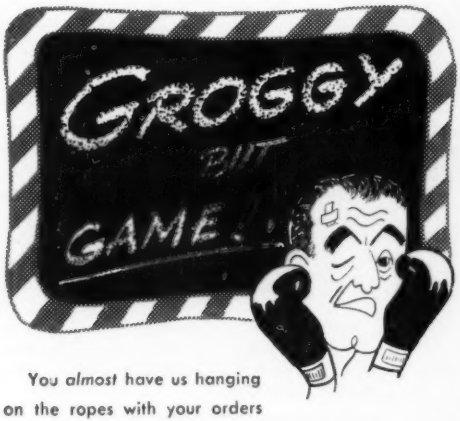


Acromark Inks for printing plastic products and materials were specially developed by our chemists. Our ink makers and our marking machine builders work closely together. The printing machines indicated above are "The No. 683 Insulated Cable Marking Machine" and "Hopper Feed Plastic Rod Printer".

Write to—The Makers of a Full Line of Marking, Numbering and Hot Stamping Machines.

The ACROMARK Company

5-15 MORRELL ST., ELIZABETH 4, N. J.

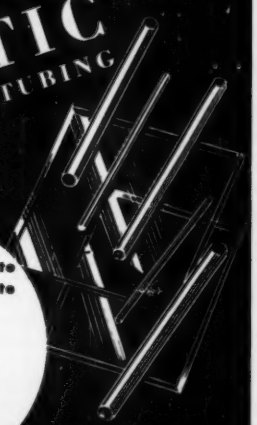


You *almost* have us hanging on the ropes with your orders for plastic molds, hobs and hobbed cavities. But we're still in there punching, doing our darndest to take care of *all* our good friends—both on civilian and defense orders.

Newark Die Company
22 SCOTT STREET, NEWARK 2, N. J.
Phone: MArket 2-3305

immediate delivery from stock—

PLASTIC
SHEET ROD TUBING



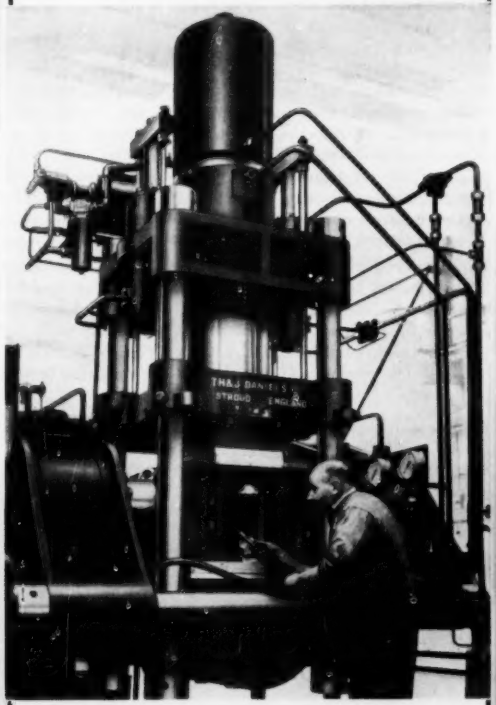
• Plexiglas • Vinylite
• Lucite • Acetate

WHATEVER YOUR REQUIREMENTS WE CAN FILL THEM!

1st and 2nd Grade Inventories and Price Lists on Request

CADILLAC PLASTIC co.
653 W. BALTIMORE • DETROIT 2, MICHIGAN
Largest Plastic Supply House In America

THIS PRESS EXCELS FOR SPLIT MOULDS



WHEREVER ELECTRIC iron handles, vacuum jugs, lamp sockets, textile bobbins and similar items requiring split moulds are to be manufactured, use of a Daniels 150/120 side ram press should be considered.

Vertical and horizontal movements are individually controlled. A prefiller tank mounted atop the press cylinder provides quick closing operation and saves hydraulic power.

The machine has many *additional interesting features* which suit it to general run compression moulding, too. They are described in Bulletin 15. Write for your copy today.

T. H. & J. DANIELS, LTD.
Stroud England

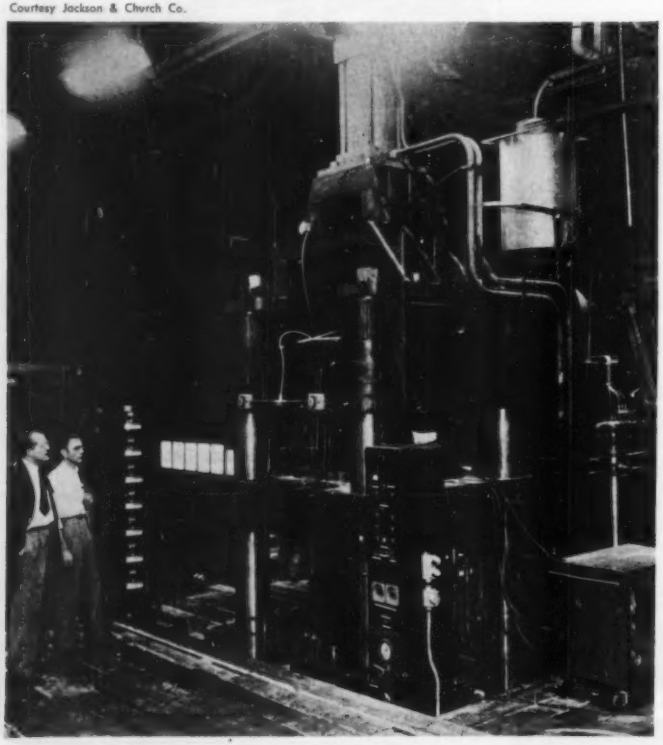
NEW MACHINERY AND EQUIPMENT

PREPLASTICIZING MACHINE—Ability to control accurately and completely injection pressures at the nozzle and in the mold is considered by Jackson & Church Co., Saginaw, Mich., as the most important feature of its new 200-oz. preplasticizing, vertical injection machine. By injecting completely plasticized material into a mold without the use of torpedoes or other devices, closer pressure control and closer control of products quality is achieved.

Recently installed and successfully tested at the Decatur, Ill., plant of General Electric Co., the new press is the culmination of a series of improvements which began with a 48-oz. unit and was enlarged progressively to a 64-, a 100-, and finally a 200-oz. machine claimed to be the first injection molding machine with a capacity of 1000 lb. per hr. on a continuing basis.

The 200-oz. press can run on a 30-sec. cycle; with the substitution of a 300-oz. injection chamber, it can produce a 300-oz. shot on about a 45-sec. cycle. Other statistics include: clamping pressure, 2000 tons, injection pressure, 100 tons; speed of movable clamp — rising, 410 in. per min., descending, 475 in. per min.; injection speed, 180 in. per min. maximum, controllable down to 10 to 15 in. per min.; a 6-in. diameter, 110-in. long screw in the extruder pump; numerous temperature control zones; and an injection ram operated by 1000 lb. line pressure developing 10,000 p.s.i. on material located in the chamber.

Pressure is accurately controlled in mold and at nozzle of 200-oz. injection machine
Courtesy Jackson & Church Co.



HEAT TRANSFER UNITS—A new standard line of electrically heated Dowtherm heat transfer units has been developed by Struthers Wells Corp., Warren, Pa. Capacities range from 100,000 to 500,000 BTU's per hour, and temperature ranges to about 750° F. using Dowtherm as a liquid or vapor medium. Other heat transfer fluids can be utilized. The Dowtherm line is equipped with a special heating element designed to eliminate thermal breakdown or coking troubles.

AIR-POWERED HYDRAULIC-DRILL—Quick setup, accurate settings, fast traverses, and built-in switches for interlocking to other equipment are among the highlights claimed for Model #19-400 air powered hydraulic drill manufactured by Delta Power Tool Div., Rockwell Mfg. Co., 600 E. Vienna Ave., Milwaukee 1, Wis. Developed for drilling, reaming, tapping, centering, chamfering, and spot facing work, the unit's hydraulic circuit derives its thrust from a compressed air supply and its control from a sealed hydraulic system. Sealed construction permits the drill to be mounted in any position.

Adjustments for rapid approach to work, feed, and final depth are grouped at the front of the unit. Length of approach and total strokes are controlled by positive stops which make it possible to approach work to within 0.005 in. at 5 in. per second rapid traverse, and to control final depth to within 0.0005 inch. Feed is infinitely variable from 0 to 50 in. per minute. At the end of the stroke, the unit returns at 4 in. per second. Full stroke is 4 inches.

THREAD INSERTS—Small-size stainless steel helical-wire thread inserts for strengthening tapped threads in plastics and other materials have been added to its line by Heli-Coil Corp., 47-23 35th St., Long Island City 1, N. Y. The four new sizes include 8-36 and 6-40 sizes in the coarse-thread series, and 5-40 and 4-40 sizes in the fine-thread series. All are available in 1-, 1½-, and 2-diameter lengths.

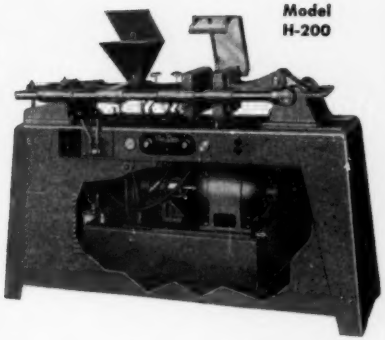
FOOT-OPERATED AIR VALVE—Faster production and reduced costs are said to result from use of Quick-As-

Model H-200

SEMI-AUTOMATIC INJECTION PRESS

2-oz. capacity. Van Dorn's engineering experience has scored again with this leader among all injection presses of its class. Its ultra-modern design insures faster operating cycles—up to 6 per minute. Push button controls are safe, simple and convenient. Accurate temperature regulation. Ruggedly built, compact and quiet.

Model H-200



Power Operated, Lever Controlled Presses—Available in 2-oz. or 1-oz. models. These profit-makers feature: Rugged all-welded construction; built-in safety devices; heating chamber with ample plasticizing capacity.

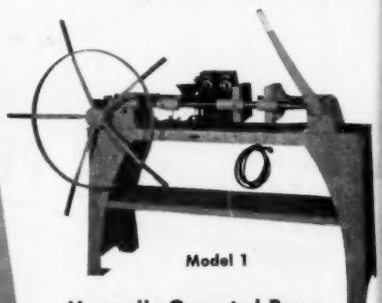
VAN DORN
Plastic Equipment

COSTS LESS to Buy...to Operate!

Van Dorn presses are *unexcelled in efficiency* and *unequalled in economy* on the innumerable jobs where a 2-oz. injection is ample. Costwise, Van Dorn presses are outstanding for these reasons:

1. **Surprisingly low in price**
2. **Operate 8 hours for a few dollars**
3. **Use less expensive molds**
4. **Easily set up by one man in a few minutes**

These presses mold practically all thermoplastics including nylon . . . Look over the Van Dorn presses and plastic equipment shown—*then write for detailed Bulletins on individual machines.*

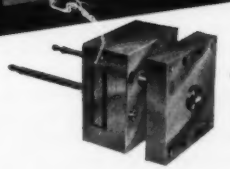


Model 1

Manually Operated Press
1-oz. capacity. Ideal for smaller jobs, experimental work, training.

Plastic Grinder
Grinds up rejects, waste, etc., for re-use. Ruggedly made, easily cleaned.

Model G-100



Mold Bases
. . . Available from stock for all Van Dorn presses.

THE Van Dorn IRON WORKS CO.
2687 EAST 79th STREET • CLEVELAND 4, OHIO
Cable Address: "VANDORN" Cleveland

The mold mark shown above has become increasingly familiar to buyers of plastic products . . . it's the symbol that identifies products molded by Cambridge Molded Plastics.

Ever since it was first introduced, it has been associated with quality injection and compression molded plastics that are notable for outstanding design, excellent molding, and fine finishing.

Whenever you see the Cambridge Molded Plastics Company trademark, recognize it for its true value—a symbol of plastic molding perfection. Complete facilities for the volume production of plastics for both defense and commercial products.

CAMBRIDGE MOLDED PLASTICS COMPANY

CAMBRIDGE OHIO

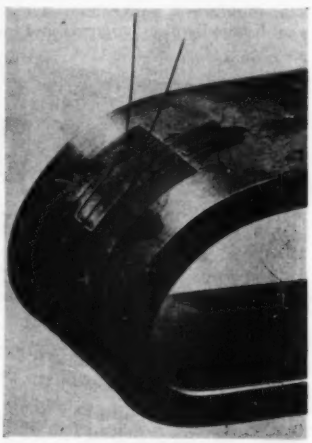
E. K. Terry
5-250 General Motors Bldg.
Detroit 2, Michigan
Phone: TRinity 4-1740

Harry S. Shaffer
Roselawn Center Building
Reading & Section Roads
Cincinnati, Ohio
Phone: JEfferson 6167

Ed Welchmann
737 N. Michigan Avenue
Chicago 11, Illinois
Phone: WHitehall 4-4888

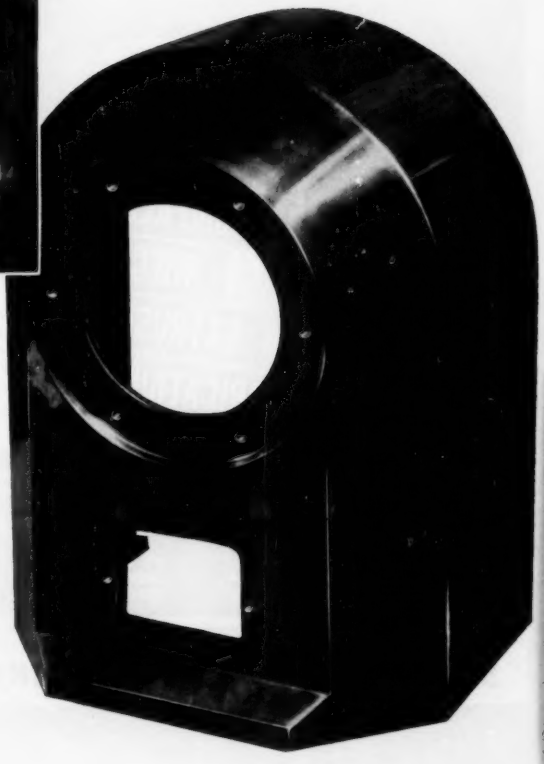
Wink foot-operated air valves manufactured by C. B. Hunt & Son, Inc., 2200 E. Pershing Ave., Salem, Ohio. Foot pressure on a pedal is all that is required to control operation of presses, hammers, hopper gates, and other types of air-operated equipment. All operating parts are enclosed and are maintained in pressure balance to eliminate creeping and crawling. Valves are available in sizes from $\frac{3}{8}$ to 1 in. and in 3-way, 4-way, neutral position, and regular actions. Single and two-pedal designs are made for air operation up to 150 p.s.i. and 150° F.

STRAIN GAGE—Strains up to 10% in materials or parts can be measured accurately by means of a new SR-4 Post-Yield strain gage designed by Baldwin-Lima-Hamilton Corp., Philadelphia 42, Pa. The gage, identified as Type PA-3, enables measurement of strains far beyond the range of other SR-4 bonded resistance wire strain gages. PA-3 has a flat-grid paper-base construction and requires a special air-drying cement which is supplied with it along with instructions for application. It has a resistance of 120 ohms, gage factor of 2.0, gage length of $1\frac{3}{16}$ in., minimum trim width $1\frac{5}{32}$ in.



MASKS AND STENCILS—Pressure-sensitive masks and stencils are being custom die cut by Gleicher Mfg. Corp., 141 Frelinghuysen Ave., Newark 5, N. J., to fit the requirements of manufacturers for varying operations. Masking tapes are available

Preform is placed in sliding drawer of 7½-kilowatt THERMEX Plastic Preheating Unit. In 1½ minutes preform will be uniformly heated throughout—ready for molding.



Thermex
PLASTIC PREHEATING APPARATUS

Quadruples output of food mixer cabinets

THE KURZ-KASCH COMPANY, Dayton, Ohio, keeps constantly on the lookout for methods and equipment that improve quality and productivity. That's why this progressive plastics manufacturer has converted its preform heating from steam to uniform, high-speed electronic heating. Thermex Engineers have played a dominant part in this modernization program, applying many 7½ Kw Thermex units such as shown.

Here preheating time for food mixer cabinets has been cut from 7 minutes to 1½ minutes. Thus output—*with the same labor*—has jumped from approximately 50 to 200 units per shift.

Because heating of preforms is thorough and uniform, the amount of shrinkage can be predetermined, and is allowed for in the dies. Thus dimensions are accurate and material waste is reduced. The product is stronger and has a better finish.

Highly productive THERMEX Preheating Apparatus boosts output without expensive plant expansion. An experienced Thermex Engineer will gladly survey your operations and make suggestions.

THERMEX—T. M. Reg. U. S. Pat. Off.

THE GIRDLER CORPORATION
Thermex Division

M

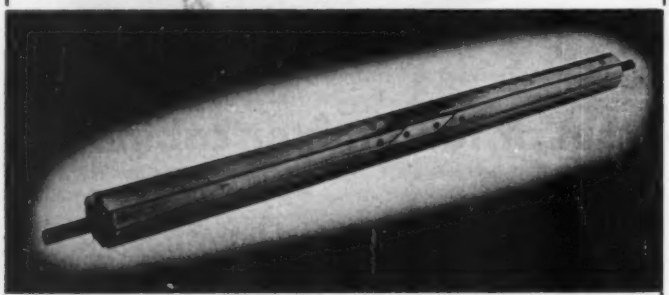
COMPRESSION
INJECTION
EXTRUSION
FABRICATION

MICHIGAN MOLDED PLASTICS, INC.

Plant and General Offices: DEXTER, MICHIGAN

Sales Offices:
DETROIT
BUFFALO
ELYRIA, OHIO
PHILADELPHIA
MINNEAPOLIS
ST. LOUIS
MILWAUKEE
CHICAGO
MOLINE, ILL.
SOUTH BEND
LANSING

STOPS FILM FROM WRINKLING!



Install Progressive Anti-Wrinkle Slat Expanders at strategic spots along your film processing line and watch those wrinkles disappear! You'll find that your equipment (embossers, tubers, batchers and the like) run faster; that your rolled film is tighter and smoother and neater than ever before. You can get Progressive Slat Expanders in widths to fit your present converting equipment. Write today for complete details and prices.

Certain sizes in stock.

Progressive machine co., inc.

Specialists in Plastic Film Handling Equipment

198-202 East 25th Street Paterson 4, N. J.

Tubing Machines • Continuous Hammers & Sealers • Film Cut-Off Reels

in any size, shape, pattern, or amount for separating colors in brush or spray painting; sand blasting patterns; protection of highly polished surfaces; and stencilling insignia and numbers. Each adhesive-backed mask and stencil is mounted on an easily removed interliner to insure faster handling. Use of the tapes is said to assure uniformity and to eliminate the wastage and inaccuracies of hand operations.

IMPROVED ENGRAVER—Cut-away construction of the Pantograph arms contributes to the new "sight feature" of the Model UE-3 Preis-Panto Engraving Machine manufactured by H. P. Preis Engraving Machine Co., 191 Industrial Branch, Hillside, N. J. The operator is afforded a centralized view of both the actual engraving and master copy being followed. Adjustments of Pantograph ratios, which range from 1.7:1 to 7:1, is accomplished on cylindrical sliding members with improved precision markings. A positive lock permits precision engraving of raised or sunken letters into a variety of metals and plastics. An improved, patented adjustable copy table holds either metal or molded plastic letter masters. A forming guide aids engraving of concave, convex, or spherical beveled surfaces. The high precision ball bearing spindle has a cam-actuated drop lever for raising or lowering the engraving cutter from the work. The lever has a drop of 5/32 in. and is graduated in 0.001-in. finger screw adjustments.

GROUND FLAT STOCK—With the addition of many new sizes, 203 standard sizes of ground flat stock (tool and die steel) are now offered by The DoAll Co., 256 N. Laurel Ave., Des

(*Continued on p. 155*)

behind **ELMES** *leadership*

A SOLID CENTURY OF ENGINEERING EXPERIENCE

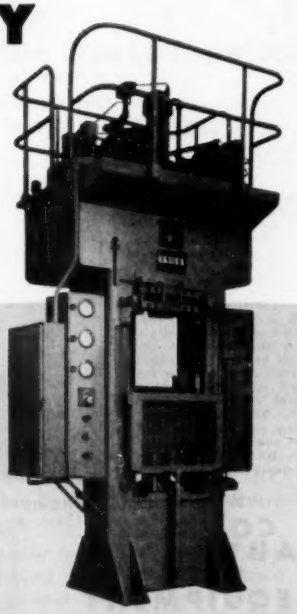
1951 marks Elmes' 100th Anniversary . . . a full century of continuous growth and progress in the design and production of hydraulic equipment . . . of continuously expanded and improved service to our host of customers down through the generations.

To industry throughout America and the world, we extend our sincere thanks and appreciation for the confidence and steady patronage which have made Elmes' remarkable growth possible.

Since the pioneering days of hydraulic engineering, Elmes Presses have meant dependable, economical performance. Today, Elmes Hydraulic Equipment is produced in one of the finest plants in the industry. This plant has large, streamlined production areas and is equipped with precision machinery of the most advanced type.

These outstanding facilities, plus engineering skill based on a century of experience in applying hydraulic machinery to specific needs, assure for Elmes' customers the very ultimate in service and lasting satisfaction.

Whether your job requirements are simple or complex, whether you need a single press or a battery of units, it will pay you now more than ever to "Put Your Pressing Problems Up to Elmes." Our engineering staff is ready at all times to help solve your hydraulic equipment problems on the traditional Elmes basis of maximum production efficiency at minimum cost.



FOR SPECIAL PRODUCTION FEATURES IN YOUR PLASTICS MOLDING PRESS

Have ELMES engineer it!

This press, typical of Elmes special-design engineering, is used for both compression and transfer molding. The change is accomplished by flicking a switch. Operation is either manual or semi-automatic, with pushbutton controls. Stroke is adjustable, with automatic position slow-down. With its many different actions, each of which can be used independently of the others, this custom-built hydraulic press provides exceptional flexibility, safety, and economy.

ELMES 100th Anniversary 1851-1951 HYDRAULIC EQUIPMENT

AMERICAN STEEL FOUNDRIES • ELMES ENGINEERING DIVISION

1159 TENNESSEE AVENUE
CINCINNATI 29, OHIO

Distributors in Principal Industrial Centers

METAL-WORKING PRESSES • PLASTIC-MOLDING PRESSES
EXTRUSION PRESSES • PUMPS • ACCUMULATORS • VALVES • ACCESSORIES

CUT SPRAY PAINTING COSTS

by rapidly wet painting three-dimensional parts, one color after another, through the use of our accurate, snug-fitting

ELECTRO-FORMED METAL MASKS

(MADE BY PATENTED PROCESS)

and foot treadle

AIR-OPERATED FIXTURES

which position and hold the piece snugly in the mask, maintain the desired pressure, and permit the operator to use both hands.

Plug-type masks for keeping depressed areas clear, while spraying background; lip-type masks for protecting the background while painting depressed areas; and block cut-out plane surface type masks.

Clean, sharply defined letters and decorative effects are obtained on intricate die castings, stampings and plastic forms by accurate control of painted areas with no fogged edges. After-wiping or buffing off of overspray is unnecessary. The "loose" inside of letters and numerals, such as "O" and "6", is held in position by arched bridging to eliminate objectionable "ties."

We also design, engineer and build

COMPLETE AUTOMATIC SPRAY EQUIPMENT

(WITH OR WITHOUT MASKS)

MASK WASHING EQUIPMENT

and

AIR-OPERATED CLAMPS, FIXTURES AND TOOLS for

positioning parts in masks while painting or holding parts in place for other operations, such as welding.

Automatic, entirely air-operated machines for spray decorating a variety of small plastic and metal parts—one color right after another—at speeds of up to 3600 per hour.

Eliminates the hazards of electric motors, mercury or solenoid switches and the cost of explosion-proof electrical equipment.

Masks are inserted so as to be flush with top of the working table. Spraying is from below. Frequency of mask cleaning greatly reduced. Dial regulates the cycling speed. Using a conveyor belt, operator can use both hands to load.

Another dial regulates the amount of paint sprayed. At any given setting, the same amount of paint is sprayed on every part, regardless of the speed of the loading cycle. Effects paint savings of up to 50 per cent over hand spraying.

Employs 8 latest automatic guns and two 2-gallon air-agitated paint pressure tanks with four insert containers.

SEND COUPON NOW!

CONFORMING MATRIX CORPORATION

364 Toledo Factories Building **Toledo 2, Ohio**

Please send, without obligation, details on ( ) Hand masks; ( ) Mechanical masking fixtures; ( ) Air operated masking fixtures; ( ) Stationary automatic spray painting masking machines; ( ) Rotary table automatic spray painting masking machines; ( ) Quotation on masks for parts (or prints) which I am forwarding.

Name .....

Firm .....

Street .....

City & State .....

SPECIALISTS IN NYLON MOLDING

CENTRAL of CHICAGO

INJECTION
COMPRESSION
TRANSFER

MOLDING OF ALL PLASTICS

Central offers in their new modern plant

- **Expert engineering**
- **Custom mold and die making**
- **Molding for industry, commerce and home**

We specialize in job-shop work and produce component parts on a contract basis

Ask for a CENTRAL estimate on your order

CENTRAL MOLDED PRODUCTS CO.

5265 W. Grand Ave. **Chicago 39, Ill.**

FILLERS

WOOD FLOUR

COTTON FLOCK

of superior quality

CLEANLINESS
LOWEST PRICES
DEPENDABLE SUPPLY
UNIFORM PARTICLE SIZE
CONTROLLED RESIN CONTENT
CONTROLLED MOISTURE CONTENT

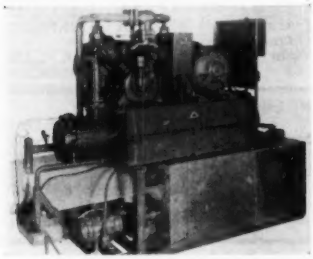
from the nation's no. 1 supplier

BECKER, MOORE & CO., INC.

NORTH TONAWANDA • NEW YORK

Plaines, Ill. Bars are available in thickness ranging from 1/64 to 1¼ in. and in widths of 3/16 to 14 inches. The product is a fine-grained electric furnace oil-hardening tool steel whose non-deforming qualities are said to assure accuracy in making gages, punches, dies, templates, jigs, fixtures, stripper plates, and other machine parts. Precision-smooth finish makes the stock ready for immediate use. To aid users in selecting proper stock, the manufacturer supplies without charge a wall chart.

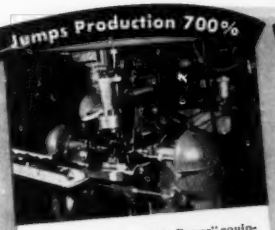
COOLER—An industrial water or brine cooler, entirely self-contained and ready for use when connected to water and power lines, has been introduced by Mayer Refrigerating Engineers, Inc., 110 Carlton Ave., Carlton Hill, N. J. Continuous, automatic supply for recirculated chilled water or brine at required temperature and volume is controlled by a push button. The unit, called the



Chil-er, is designed for diversified, heavy-duty cooling. It includes a high head, high volume water circulating pump, storage tank, and complete auxiliary equipment assembled on permanent steel skids that eliminate the need for any foundation or bolting down. The unit operates on either gravity or pressure water return, and is available in eight sizes of from 3- to 150-ton capacity.

DIRECT FLOW PUMPS—Chemical handling, hydraulic systems, and oil field service are among the applications of the new 3-in. Stroke Triplex direct flow pump announced by The Aldrich Pump Co., Allentown, Pa. Improvements in the new model have eliminated two right-angle turns in the fluid-end block, resulting in reduced "loss space" in the fluid-end, improving volumetric efficiency, and saving materials.

Jumps Production 700%



Bellows "Controlled-Air-Power" equipment in this drilling operation increased production from 585 parts per day to over 4000 parts.
Foto Facts File FF-50-656

Tapping "For Free"

A Bellows Drill Press Feed automatically drills four holes in bakelite part. Not only was drilling production doubled but the operator used his "free" time to tap the drilled holes.
Foto Facts File FF-47-414

These Inexpensive Air Powered Units Can Double the Output of Standard Machine Tools

Four Bellows Drill Press Feeds enable this special built drilling machine to drill 15 holes in three different planes, and drill and countersink another hole in a fourth plane in a phenolic part, all in ten seconds.
Foto Facts File FF-47-359

851-3

PRODUCTION of such standard machines as drill presses, tapping machines, milling machines and grinders is frequently more than doubled by the use of inexpensive Bellows "Controlled-Air-Power" Devices.

These small, compact, versatile power feeding and holding units replace manual feeding and clamping . . . make standard hand fed and hand clamped machine tools fast automatic units—actually pay for themselves with the first few days of added production.

Bellows "Controlled-Air-Power" Feeds have a "touch" as sensitive as the most skilled operator, feed work or tools hour after hour with the same uniform, precise feeding action. Bellows Air Vises, or fixtures operated by Bellows Air Motors, hold light or heavy parts in perfect safety, can be synchronized to open and close automatically with the movement of the machine.

If you're looking for ways to increase machine output quickly, investigate the use of Bellows "Controlled-Air-Power" Devices.

Write

FOR FREE NEW FOTO FACTS FILE TODAY

Case histories, photographs, diagrams of Bellows installations which are increasing production from standard machine tools 50% to 500%. No cost, no obligation. Address: Dept. MP851.

THE BELLOWS CO.
222 W. Market St.
Akron, Ohio

The Bellows Co.
ESTABLISHED 1901
AKRON 9, OHIO

COTTON FABRICS

FOR
COATING
AND
LAMINATING

★

J.H. LANE & CO., Inc.

250 W. 57th St. • New York, N. Y.

The A'B'C's of
PLASTIC FABRICATING
(ACRYLIC AND ROYALITE)

AMPLEX MANUFACTURING CO.
—A leader in the field of Acrylic and Royalite plastic fabrication.

BETTER WORKMANSHIP
—Due to a better knowledge of the basic materials and fabricating processes, plus the most modern equipment.

CLOSER COOPERATION
—Between you and our engineering staff results in the best solution to any problems.

Forming, Free Blowing, Vacuum Forming, Machining, Assembling, etc.

WRITE NOW!
Dept. M
2325-31 FAIRMOUNT AVE.
PHILADELPHIA 30, PA.

Production of

FOR the purpose of this report, production is the sum of the quantities of materials produced for consumption in the producing plant for transfer to other plants

PLASTICS AND SYNTHETIC RESIN PRODUCTION
From Statistics Compiled

Materials	*Total p'd'n. first 4 mos. 1951*	*Total sales first 4 mos. 1951*
CELLULOSE PLASTICS:[a]		
Cellulose acetate and mixed ester plastics:		
Sheets, under 0.003 gage	5,420,557	5,282,776
0.003 gage and over	4,254,755	4,275,545
All other sheets, rods and tubes	2,314,436	2,222,596
Molding, extrusion materials	25,928,503	24,068,183
Nitrocellulose:		
Sheets	2,475,046	2,234,636
Rods and tubes	424,355	454,498
Other cellulose plastics[b]	4,686,103	4,650,877
PHENOLIC AND OTHER TAR ACID RESINS:		
Laminating	28,652,173	19,890,078
Adhesives	14,479,148	13,155,758
Molding and casting materials[a]	80,786,984	71,702,177
Protective coatings (unmodified and modified except by rosin)	8,830,615	6,448,224
Miscellaneous uses	25,921,596	25,436,706
UREA AND MELAMINE RESINS:		
Adhesives	34,390,873	31,650,361
Textile-treating resins	10,287,795	8,719,817
Paper-treating resins	5,450,509	4,920,602
Protective coatings, modified and unmodified	11,705,781	8,430,507
Miscellaneous uses, including laminating and molding[c]	30,648,545	26,792,957
STYRENE RESINS:		
Molding materials[a]	77,592,990	76,585,088
Protective coatings, modified and unmodified	13,771,813	13,481,787
Miscellaneous uses	19,377,613	17,838,155
VINYL RESINS:[d] Total	144,660,642	136,927,119
Sheeting and film (resin content)[e]		57,833,510
Adhesives (resin content)		3,549,671
Textile and paper-treating resins (resin content)[f]		14,763,851
Molding and extrusion materials (resin content)		44,776,559
Protective coatings (resin content)		9,763,639
Miscellaneous uses (resin content)		6,199,889
COUMARONE-INDENE AND PETROLEUM POLYMER RESINS:	59,143,423	58,392,513
MISCELLANEOUS SYNTHETIC PLASTICS AND RESIN MATERIALS:		
Molding materials[a, g]	25,926,141	23,214,665
Protective coatings[h]	6,240,718	7,117,864
All other uses[i]	35,220,521	33,702,837

[a] Dry basis unless otherwise specified. † Revised. [a] Includes fillers, plasticizers, and extenders. [b] Includes sheets, rods, and tubes, and molding and extrusion materials. [c] Data on resins for laminating and miscellaneous uses are on a dry basis; data on molding materials are on the basis of total weight. [d] Production statistics by uses are not representative, as end-use may not be known at the time of manufacture. Therefore, only statistics on

Plastics Materials

of the same company, and for sale. Sales include only the quantities involved in bona fide sales in which title passes to the purchaser.

IN POUNDS* FOR MARCH AND APRIL, 1951
by U. S. Tariff Commission

March 1951		*April 1951*	
Production	*Sales*	*Production*	*Sales*
1,271,004	1,252,865	1,525,945	1,451,662
1,048,484	1,032,778	1,089,146	1,084,423
666,622	483,155	645,634	635,431
6,214,704	6,101,132	6,707,158	6,002,078
679,652	569,065	594,993	534,484
127,012	117,191	99,979	95,306
1,252,083	1,208,381	1,043,708	1,084,968
8,019,285	5,150,720	6,922,891	4,794,311
4,093,827	3,761,353	3,078,582	2,943,478
21,382,356†	18,843,922	19,792,143	17,646,890
2,171,222	1,560,281	2,569,484	1,824,509
6,357,027†	6,476,563	6,878,002	6,669,914
9,149,386	8,947,618	1,197,948	7,621,912
2,254,968	2,128,175	1,919,212	1,943,243
1,632,466	1,468,291	1,536,434	1,291,261
3,151,173	2,339,084	2,885,462	1,769,507
8,423,389	8,007,064	8,432,080	7,027,924
20,570,222	20,213,805	20,359,056	20,821,325
3,347,752†	3,157,894†	3,882,421	3,227,802
4,591,975	4,399,930	5,139,212	4,447,986
37,880,205†	35,606,267†	39,259,886	34,439,031
	15,359,196		13,943,903
	791,580		996,337
	3,959,010		3,757,015
	11,553,729		12,173,546
	2,223,316†		1,788,320
	1,719,436†		1,779,910
15,758,236	15,796,335	16,063,469	15,636,378
6,644,328	6,225,077	6,674,221	5,829,776
1,667,374	1,774,853	1,588,643	1,876,709
9,918,518†	9,266,792	7,365,756	7,047,866

total production are given. * Prior to January 1951, statistics were given on the basis of total weight. ‡ Includes data for spreader and calendering-type resins. § Includes data for acrylic, polyethylene, nylon, and others. ¶ Includes data for epichlorohydrin, acrylic, polyester, silicone, and other protective coating resins. ‖ Includes data for acrylic, rosin modifications, nylon, silicone, and other plastics and resins for miscellaneous uses.

Engrave
. . . PANELS UP TO 25" WIDE
IN YOUR OWN SHOP WITH THE
NEW ENGRAVOGRAPH
Portable Model 1-S
TRACER GUIDED FOR UNSKILLED LABOR

The only portable machine which reproduces 15 sizes from one master alphabet.

The only one with adjustable copy holding slides for multiline engraving in one set-up.

Self-centering holding vise for nameplates.

Send for Booklets
1-S20—portable model
H-20—heavy duty model

new hermes
NEW HERMES, Inc.
Engravo graph
13-19 University Pl. N. Y. 3, N. Y.
CANADA: 359 St. James St., Montreal
World's Largest Manufacturer of Portable Engraving Machines

Rated A-1

ROYAL precision MOLDS

A product of modern production methods, and know-how and experience gained in over 25 years, ROYAL MOLDS represent the highest level achieved in moldmaking.

ROYAL MOLDS are rated A-1 because they give you full value . . . produce quality moldings.

Our engineering department will help you solve your problems. Call on them . . . or send your blueprints for estimate.

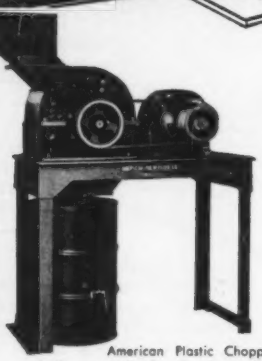
ROYAL TOOL CO.

198 Knowlton Street — Bridgeport 8, Conn.

Telephone 4-6230

PLASTIC MANUFACTURER REDUCES 200,000 LBS. OF PLASTIC SCRAP YEARLY

with this



AMERICAN

ROTARY KNIFE

PLASTIC CHOPPER

IN USE EVERY DAY . . .
6 DAYS A WEEK!

In the past year, this American KC-9 Rotary Knife Plastic Chopper, installed at a large St. Louis plastic molding company, has reduced over 200,000 pounds of plastic scrap to an homogenous granulation . . . at a rate of up to 1500 lbs. per day. (Short scrap is being run through at an average of 300 lbs. per hour.)

American Plastic Choppers—available in two sizes, 9x9 and 9x12—are built for the heavy-duty demands of constant, tough usage. Size, shape, or kind of plastic is no problem for this sturdy machine. The clean, shearing action of the adjustable rotary cutter blades of fine tool steel, provide fast, once-through reduction.

Write for your copy of
"GRINDING PLASTIC SCRAP PROFITABLY"

American **PULVERIZER COMPANY**

Originators and Manufacturers of Ring Crushers and Pulverizers

1117 Macklind Ave.
St. Louis 10, Mo.

SPLCORP
RIGID PLASTIC SHEETS

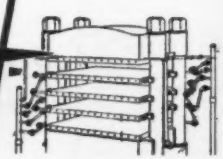
CORRUGATED or PRESS POLISHED

transparent, translucent or opaque
manufactured to your specifications

YOUR REQUIREMENTS for custom-manufactured thermoplastic sheets, either corrugated, press polished, embossed or laminated, can be met by Scranton Plastic Laminating Corp. We manufacture close tolerance Splcorp sheets from .005" to 2" thick, up to a maximum of 51" by 108".

Among the materials which we can incorporate in these sheets—both for the sake of appearance and for strength—are wood, Fiberglas, wire screen, metal foil, fabric and paper. Your inquiry will receive prompt attention.

displays
construction
decoration
lampshades
surfacing



SCRANTON PLASTIC LAMINATING CORP.

3218 PITTSTON AVENUE
SCRANTON 6, PENNSYLVANIA

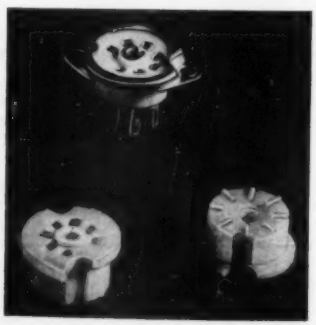
Tiny Tube Socket

SEVEN-PIN miniature tube sockets designed to meet R.M.A. and JAN specifications in the electronics industry are being compression molded of tetrafluorethylene resin by an unusual technique. A product of Teflon Products Div., United States Gasket Co., Camden, N.J., the sockets are said to be particularly adaptable to applications where high or low ambient temperatures or frequency stability present operating problems.

U.S. Gasket compression molds its Chemelec tube socket from powder, using a 4-cavity die under pressure of 2000 p.s.i. The socket is then sintered at 700° F., length of cook being determined by the size of the mass and time needed to bring it to desired temperature. The part is removed from the oven and allowed to cool at room temperature and atmospheric pressure. Metal pins and a mounting bracket are then assembled to the molded socket. Current production is at the rate of 1000 units per day.

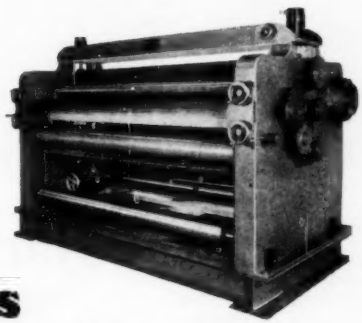
Among the properties contributing to the electrical value of the Teflon tube socket are a loss factor of less than 0.0005 and dielectric constant of only 2.0 from 60 cy. to 30,000 mc. The socket can be used at any temperature between −110° to 575° F. for long periods with negligible change in dielectric strength, power factor, and other critical properties. Moreover, it will not carbonize in case of arcing, has a water absorption rating of 0.0% by A.S.T.M test, and is unaffected by extreme humidities, corrosive atmospheres, or fungus.

Miniature seven-pin tube socket is compression molded of tetrafluorethylene



NEW REVERSE ROLL COATING METHOD CALLED CONTRACOATING

CONTRACOATER



KOHLER SYSTEM EQUIPMENT • PRODUCT OF DILTS

Dilts

Use the Contracoater for:
coating, casting, treating, impregnating
an
paper, cloth, foil, film, duck
with
lacquers, resins, organisols, plastisols
at
speeds to and above 300 FPM, depending on drying capacity,
to obtain
controlled uniform coating in exact thickness and width

Developed by Dilts in cooperation with experienced operators of coating machinery, this new machine offers the advantages and eliminates the disadvantages of ordinary reverse roll coaters.

There is no creeping of coating past dams in the Contracoater because the dams are located under, not over, the metering rolls. Gravity aids, does not hinder, the control of coating widths in the Contracoater.

It will pay you to find out about the Contracoater.

Contact Dilts for Contracoaters and for complete coating installations. Write for "Design of the Month" No. 5.

DILTS MACHINE WORKS, Fulton, New York • Division of the Black-Clawson Co. Hamilton, Ohio

FORM GRINDING **of cylindrical parts from non metallic materials is our specialty. Our range of size is from ⅛ to ¾ diameter and up to 7" long. We can hold tolerances of ±.002 on plastic and ±.005 on wood.**

- **If you make such parts or are planning a change from aluminum, brass or steel screw machine parts we can increase your production capacity. Send a print or sample for quotation.**

ORANGE PRODUCTS, INC. FORM GRINDING SPECIALISTS

Always SAFE to use . . .

STAFLEX®

QMXA Stabilizer

SAFE TO HANDLE . . . contains no metals with cumulative toxic effect.

SAFE FROM DISCOLORATION . . . in presence of sulfur.

SAFE TO PRINT ON . . . never lacks adhesion.

SAFE AT ALL TEMPERATURES . . . Insures complete stability during processing.

Write Dept. MP for data and samples

DEECY PRODUCTS CO.
PLASTICIZERS STABILIZERS
120 Potter St., Cambridge 42, Mass.

Introducing A New Name to The Plastics Industry

THE LEWIS WELDING & ENGINEERING CORP. brings to the plastics industry the designing and manufacturing facilities well known to hundreds of users of special machine tools.

LEWIS has acquired all rights to the sale and manufacture of the former MACRAY Injection Molding Machine which was built in the Lewis shops and sold by the MacRay Engineering Co. of Cleveland, Ohio. Lewis will continue to build these machines and has established a national sales organization to provide adequate service to owners of MacRay and Lewis machines.

*

THE LEWIS WELDING & ENGINEERING CORP.
BEDFORD, OHIO EUCLID, OHIO

Battle Suit

A FLEXIBLE expanded plastic developed by United States Rubber Co. is now being used in a vest and watertight face seal in the quick-donning battle suits made by the company for the Navy. The material, known as Ensolite, is honeycombed with millions of tiny, nonconnecting air cells for buoyancy.

Because the material is soft and light in weight, it can also be used for life vests where it adapts itself easily to body contours; its resistance to moisture enables it to stay afloat for long periods of time. An Ensolite life vest can be designed that will float a stunned or unconscious man with his face up and prevent him from drowning.

Ensolite's shock-absorbing qualities suggest its use as a protective wrapping for delicate instruments that are air dropped, and as eye pieces for gunners and headrests for aerial photographers. Protective body pads for basketball, football, and hockey players, which require shock-absorbing properties, are also potential applications.

The material is available in a range of densities from 4 to 15 lb. per cu. feet. It is made in flat sheets from ⅜ to 1½ in. thick, and can be molded in contoured shapes.

Life vest produced of expanded plastic can keep a man afloat for long periods
Courtesy United States Rubber Co.

KEY to easy, on-the-spot coloring of ALL PLASTICS:

DRYCOL

No further reason for ANY molder to have problems in coloring any quantity of PLASTICS. If your needs call for on-the-spot coloring . . . right in your plant . . . use DRYCOL, Gering's "magic" colorant . . . supplied in 17 brilliant shades, all conforming to Bureau of standards colors. (Special colors may be ordered). Drycol is dust-free, compact, economical. Supplied in convenient units to color 50 and 100 lbs. of plastics in any mixing drum, ready to mold.

Sample packet for 100 lbs. furnished gratis. Call on our technical service department for recommendations.

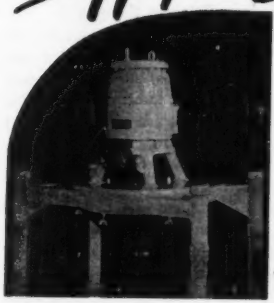
Write Dept. MP

GERING

Products Inc.

KENILWORTH, N. J.

NEW *High Speed* MIXER



- Reduces Pre-Mixing Time
- Provides Complete, Uniform Dispersion of Plastics Ingredients
- Improves Color Blending

The "ENTOLETER" Mixer provides the simplest, most economical method of producing a homogeneous mix. It is easy to install and operate. Requires only 12 cubic feet of space; yet can produce a finished mix at rates up to 200 lbs. a minute. It is adaptable to either batch or continuous mixing. Entoleter Division, The Safety Car Heating & Lighting Co., Inc., 1195 Dixwell Ave., New Haven 4, Conn.

Send for bulletin and reprint describing results on plastics applications.

ENTOLETER
CENTRIFUGAL MACHINES

Miller
WOOD FLOUR

Formulated to meet the strict requirements of the plastic industry. Miller Wood Flour is an approved uniform product. Available in 4 standard grades, or made up to meet your particular specifications.

Prompt Shipment.
Phone, wire, write us regarding your requirements.

Frank Miller & Sons
2252 West 58th Street, Chicago 36, Illinois

FOR PRODUCTS
WAITING
TO BE
MADE...

Stanley
PLASTISOLS
FOR MOULDING
OR COATING
ORGANOSOLS
FOR FABRIC OR
PAPER COATING
...FOR DIPPING

For today's defense program Stanley Plastisols and Organosols can be formulated to meet rigid government specifications with emphasis on low temperature flexibility and resistance to fungus. For tomorrow's competitive selling they'll assure greater durability and sales appeal for your product. Write today and take advantage of our years of experience in the vinyl field: Stanley Chemical Company, 71 Berlin Street, East Berlin, Conn.

STANLEY
Industrial Coatings
STANLEY
CHEMICAL
LACQUERS JAPANS SYNTHETICS ENAMELS

Graphic Laminate Door Liner

DESCRIBED as the first decorative laminate incorporating as many as eight different colors, a special panel now being produced by Decar Plastic Corp., Middleton, Wis., for Amana Refrigeration, Inc., suggests the many potential applications for graphic laminates of this type.

This specially developed piece, measuring approximately 26 by 30 in., is used as an inner door liner or breaker panel in the lid of self-service frozen food cabinets made by Amana. When the box cover is in an open position, the panel also serves as an advertisement for the packaged frozen foods within. Pictured on the panel, in their actual colors, is the well-known Snow Crop family of frozen concentrates—orange juice, orange and grapefruit juice, lemonade, grape juice, grapefruit juice and frozen coffee.

Against a light blue background, the top half of the panel features Teddy Snow Crop, familiar trade character seen in printed advertising and on the company's television program. He is shown carrying a big pitcher of orange juice and a tray with four glasses of the reconstituted concentrate. The lower part of the panel is devoted to related Snow Crop items, enlivened by smaller drawings of Teddy. A circular price patch next to each concentrate lists the size of the package and the reconstituted volume of the product. The price of each concentrate can be written directly on the liner by the retailer with wax crayon, and changed by erasing with a damp cloth.

Door liner made of decorative laminate carries colorful ad for contents of box

Before adopting this laminate panel, Amana utilized a lid liner made of Masonite hardboard with a sprayed white finish or a silk-screened decorative design. This construction, however, left something to be desired from the service standpoint. Amana wanted a durable, scratch- and wear-resistant surface which would not be affected by water, cleaning powders, or other materials with which the panel would normally come in contact. Decorative Decarlite, which had been developed for even more severe service conditions, was recommended as a possible solution.

There still remained the question of incorporating the necessary advertising copy and designs in the laminate as a display medium. Working with Plastics Specialties Co., Trenton, Mich., Decar had a group of materials developed for the Amana panel, and a series of special Lamiprint printing inks were used in printing the panel in eight colors. Then a group of resin-impregnated papers were selected to produce the desired qualities in the panel.

By means of these materials and a processing technique worked out by the companies involved, it was found possible to laminate the entire assembly to Masonite in a one-shot process under heat and pressure, with the Snow Crop copy permanently protected by a melamine-impregnated surface sheet. The result was a finished display panel having the durability of decorative grade Decarlite with the design embodied in the final assembly. A special cutting die made by the laminator cuts the complete panel in one operation, trimming it to size, rounding the corners, and punching four corner holes and one center opening.

The Snow Crop panel is not only one of the largest graphic laminates produced to date but is also unusual from the standpoint of the many colors involved. As a permanent, colorful display medium, such panels offer wide possibilities in the advertising and display field.

Save Time, Labor, Dollars!

TEST • STUDY • CONTROL VISCOSITY

As Simply, Quickly and Easily as Taking Temperature Readings

Just a flick of a switch, then read the Brookfield dial, and you have your viscosity determination in centipoises. The whole operation, including cleaning up, usually takes *less than a minute.*

Available in a variety of models suitable for extremely accurate work with both Newtonian and non-Newtonian materials, Brookfield Viscometers are portable and plug in any A.C. outlet — *can be used in Lab, Plant or both.*

Write today for fully illustrated catalog showing Brookfield Viscometers adaptable to any viscosity problem *from less than one to 32,000,000 centipoises.*

BROOKFIELD COUNTER-ROTATING MIXER — Two concentric, oppositely rotating shafts, propeller equipped and driven by two motors, produce an annular flow and up to 48,000 scissor-like cuts/minute. Enable exceptionally fast, effective and efficient laboratory mixing. *Not* a "stirrer." Write for Brookfield MIXER brochure.

Brookfield ENGINEERING LABORATORIES, INC.
97 Porter S., Stoughton, Mass.

For Plastics Manufacturers

Here is an extraordinary reducing valve for plastics plants that takes care of pressures as high as 6,000 lbs. per sq. in. *without shock.* With the utmost ease it handles air, water, or oil. In buying, all you need do is—specify

ATLAS Type "E"

High Pressure Reducing Valve

What Will You Get?

You will get a regulating valve made by a concern that has been in the regulating valve business **exclusively** for more than a half century. You will get a valve body that is made of the strongest forged steel. The main valve and the seat ring, subject to severest abrasion and corrosion, are Stellited. Other internal parts are of hard chromium plated stainless steel. A formed packing of special material superior to leather is used which is immune to all fluids commonly used in hydraulic machinery. The pressure on the seat is balanced by a piston with the result that variations in high initial pressure have little effect on the reduced pressure. **Why not get complete data? We will gladly send it by return mail.**

For other ATLAS plastics plant products see the partial list in our ad in the January 1951 issue of MODERN PLASTICS

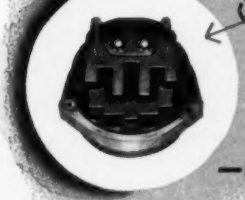
ATLAS VALVE COMPANY
REGULATING VALVES FOR EVERY SERVICE
277 South Street, Newark 5, N. J.
Represented in Principal Cities

Tool Handles Molded by Mack for Henry Disston & Sons, Inc., leading Manufacturers of Tools and Knives.

Gauge Case Molded for the Ashcroft Long-Life Duragauge with the Revolutionary Nylon Movement (Patent Applied For).

MACK custom-molded components

Distributor head molded by Mack for Scintilla Magneto Division of Bendix Aviation Corporation.

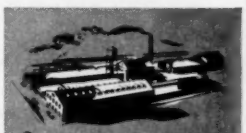


DESIGN MOLDING MOLD MAKING

—INCLUDING

precision molded parts

FROM 3 COMPLETE PLANTS



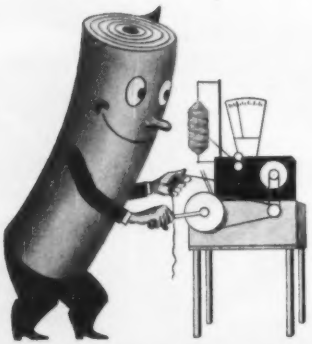
● WAYNE, NEW JERSEY

● ARLINGTON, VERMONT

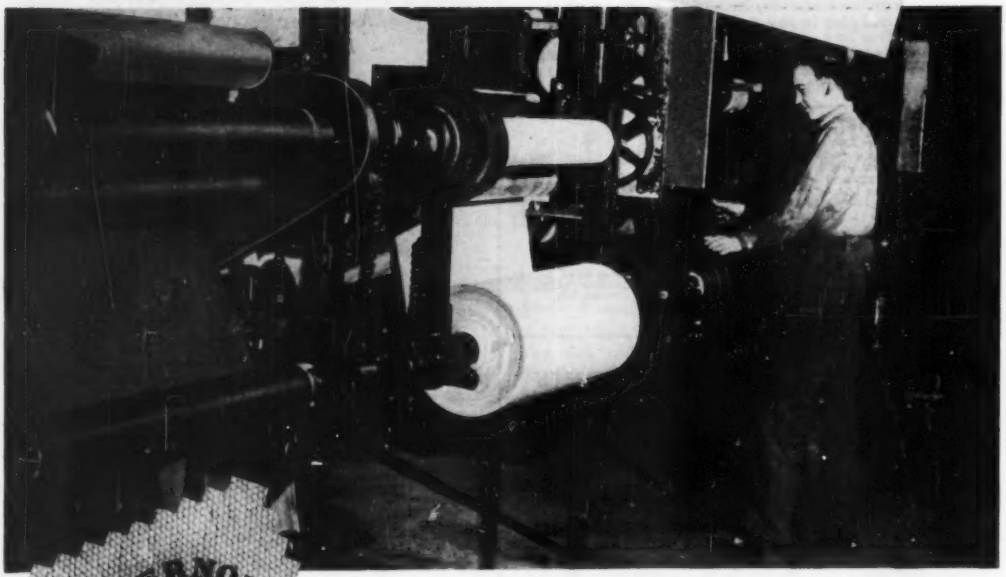
● WATERLOO, P. Q. CAN.

Specify Mack with confidence for all plastic molding requirements. One of the original plastic molders, Mack experience dates back over three decades to the beginning of the industry. From design to final inspection, Mack Molding methods are keyed to meet industry's varied needs. Complete service—from blueprint to finish—features deliveries to meet assembly line schedules. Inquiries will receive prompt attention; address Mack Molding Company, Inc., Wayne, New Jersey.

Mack
MOLDED EXCELLENCE
OVER 30 YEARS OF MOLDING SERVICE TO INDUSTRY



UNIFORMITY
Makes the Big Difference in LAMINATION
Fabrics



MT. VERNON EXTRA

Gives You Greater Fabric Uniformity

The rigid laboratory checks which control production of Mt. Vernon Extra fabrics assure the high degree of uniformity needed for dependable lamination

AT YOUR SERVICE

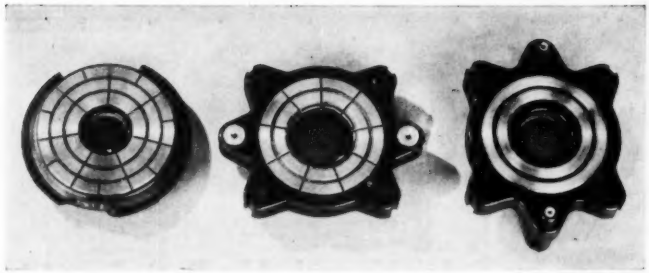
Mt. Vernon-Woodberry's staff of textile engineers is available on request to help you with your problems in development or application of industrial fabrics.

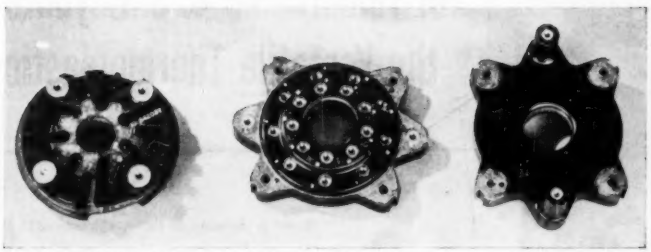
Mt. Vernon - Woodberry Mills

TURNER HALSEY COMPANY
Selling Agents
40 WORTH ST NEW YORK

Branch Offices: Chicago • Atlanta • Baltimore
Boston • Los Angeles • Akron

CHECKING COEFFICIENT OF VARIATION And Average Factor Of Quality On Evenness In Roving With Belger Tester. One of a series of comprehensive laboratory controls throughout production to assure uniformity in all Mt. Vernon-Woodberry products.





Photos courtesy Bakelite Co.

Front and rear views of collector plate (left) and two types of distributor blocks molded of heat- and shock-resistant phenolic, and used in magnetos of aircraft ignition systems

Phenolic in Aircraft Magnetos

CONSTANT changes in the aircraft industry over a period of years have created problems pertaining to the performance of the ignition system. To enable the ignition system to keep pace with other refinements in the field, Scintilla Magneto Div., Bendix Aviation Corp., Sidney, N.Y., has developed a new low-tension system in which a number of phenolic parts play an important role.

Among the aviation advances which have contributed to the need for an improved ignition system are: the growing number of cylinders per engine; the use of radio shielding, requiring that ignition wires be enclosed in metal conduits; the trend toward all-weather and high-altitude flying; and the rapid development of high-output engines.

To meet the demands of these factors, the low-tension concept was devised by Bendix-Scintilla on the basic premise that distribution of high voltage must be eliminated.

The new system differs from the conventional high tension type in that only low tension impulses are generated by the magneto and are transmitted, still at low voltage, through the distributor and harness directly to a number of induction coils located on the engine near the spark plugs. Here, the voltage is stepped up by transformer action, and short leads conduct the high tension current to the spark plugs.

Operating efficiency of the system as well as efficient production of vital parts was achieved by molding the distributor block and collector plate of Bakelite shock- and heat-resistant phenolic. This mineral-filled material proved especially desirable for these applications, since it reduced the tendency of certain molded parts to crack around inserts. The size and construction of inserts involved in these components is conducive to high stresses, but the stresses have been minimized by the use of this phenolic. For example, the low mold shrinkage of phenolic (0.001 in. per in.) has reduced stresses from shrinkage.

At the same time, the crack-resistance of phenolic has proved valuable, since the parts are subjected to extremely wide changes in temperature in a relatively short period of time.

SUPERIOR has helped make famous brand names successful!

- RADIO & TELEVISION MFRS.
- REFRIGERATION MFRS.
- ELECTRIC APPLIANCE MFRS.
- OTHER ALLIED INDUSTRIES

LET SUPERIOR Improve Your Product or Create a New One!

SUPERIOR can produce your plastic products more profitably for you at LOWER COSTS . . . made possible by many years of "know-how." Industries, large and small, use SUPERIOR because they know SUPERIOR takes pride in producing the highest quality work . . . prompt, efficient service . . . fast delivery.

SUPERIOR Can Help You!

FROM DESIGN TO FINISH

SUPERIOR . . . experts in the molding of thermoplastics by injection and extrusion . . . offer you a very thorough and experienced designing and engineering staff . . . most modernly equipped finishing department . . . and a very complete mold and die shop. Injection machines up to 48 oz. Extrusions of all shapes, tubing up to 6" diameter. REMEMBER: For ANY Thermoplastic problem . . . SUPERIOR is the solution!

Write or Phone Today

SUPERIOR PLASTICS Inc.

DEPT. 20C

410-430 N. Oakley Blvd., Chicago 12, Ill.

Phone CA 6-4540

2 out of 1,000 uses

for remarkable U. S. Royalite the Versatile Thermoplastic

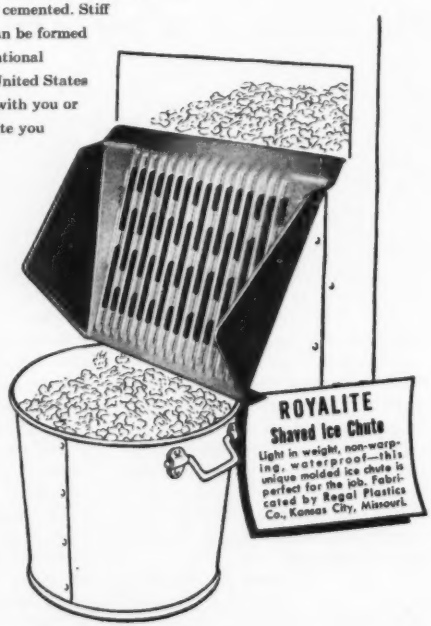
ROYALITE
Auto Fender Stone Guard
In this application, Royalite's toughness, hardness and ability to withstand great impact without splintering make it especially valuable in the automotive industry.

There is virtually no end to the uses of U. S. Royalite. Designers and engineers say it gives them new freedom of design, lets them attain an efficiency often never possible with any other thermoplastic.

Royalite is obtainable either standard or flame-resistant. It can be sawed, sheared, sanded, punched, nailed, bolted, riveted, sewed and cemented. Stiff or flexible, hard or soft, it can be formed on standard equipment with conventional techniques. The engineering staff of United States Rubber Company will be glad to work with you or advise you on any application of Royalite you may suggest.

ROYALITE IS:

- ★ Standard or flame-resistant
- ★ Lightweight
- ★ Non-splintering
- ★ Non-Warping, non-corrosive
- ★ Tough
- ★ Highly resistant to impact
- ★ Waterproof, stainproof
- ★ Not affected by oils, most acids, alkalies
- ★ Available in different colors, for easy classification
- ★ Stable under changing atmospheric conditions
- ★ Exceptional electrical insulating properties
- ★ Low rate of heat conductivity



ROYALITE
Shaved Ice Chute
Light in weight, non-warping, waterproof—this unique molded ice chute is perfect for the job. Fabricated by Regal Plastics Co., Kansas City, Missouri.

u.s. Royalite®
STANDARD OR FLAME RESISTANT

SEE NEXT PAGE FOR LIST OF U. S. ROYALITE FABRICATORS➡

UNITED STATES RUBBER COMPANY
2638 North Pulaski Road • Chicago 39, Illinois

U.S. Royalite
STANDARD OR FLAME RESISTANT

CONSULT THESE EXPERIENCED FABRICATORS OF ROYALITE

CALIFORNIA
Horace L. Blackman Co., 287 So. Robertson Blvd., Beverly Hills
General Plastics Corp., 723 W. Broadway, Glendale 4
Engineering Plastics Co., 1475 El Mirador Dr., Pasadena 3
National Plastics Industries, 425 Divisadero St., San Francisco
Hollywood Plastic Arts, 503 W. Olympic Blvd., Los Angeles 15
Swedlow Plastics Co., 5527 District Blvd., Los Angeles 22
Westwood Craftsmen, Inc., 2043-45 Pontius Ave., Los Angeles 25
Associated Mfg. Co., 541 S. Fair Oaks Ave., Pasadena 2

COLORADO
Pikes Peak Plastic, 5 W. Cucharras St., Colorado Springs
Denver Plastics, Inc., 260 S. Dale Court, Denver 9

FLORIDA
Plastics Design & Mfg. Company, Box 61, Tallahassee

GEORGIA
Gladwin Plastics, 542 Courtland St. N. E., Atlanta

ILLINOIS
Arrem Plastic, 1539 N. Throop St., Chicago 22
Associated Plastics Fabricators, 164 N. May St., Chicago 7
L. A. Goodman Mfg. Co., 131-145 W. 63rd St., Chicago 21
Laidman-Krispin Co., 1308 N. Halsted St., Chicago 22
Cortland Industries, Inc., 4545 W. Cortland St., Chicago 39
Neo Products Co., 2534-38 S. Kedzie Ave., Chicago 23
O-Lin Products, 3755 Kedzie Ave., Chicago 18
Precision Plastic Products Inc., 628 W. Lake St., Chicago 6

INDIANA
General Plastics Corp., 1400 N. Washington, Marion

MARYLAND
Fawn Plastics Co., 2902 Hamilton Ave., Baltimore 14

MICHIGAN
Cadillac Plastic Co., 651 W. Baltimore, Detroit 2
Imperial Industries, 4435 Walker Ave., Wayne
Kline Mfg. Co., 50 Cottage Grove S.W., Grand Rapids 2
Reynolds Plastics, Inc., 3445 W. Forth St., Detroit
Fabri-Kal, 242 East Kalamazoo Ave., Kalamazoo
Woodall Industries Inc., 7565 E. McNichols Rd., Detroit 34

MINNESOTA
T. O. Plastics, 58th & Longfellow, Minneapolis
Plastics, Inc., Chestnut & Ryan Sts., St. Paul 2

MISSOURI
Regal Plastics Co., 710 Main St., Kansas City

NEBRASKA
Omaha Plastics Co., 1470 S. 16th St., Omaha 9

NEW JERSEY
Silicocks-Miller Co., 10 W. Parker Ave., Maplewood
Stokes Molded Products, Inc., Taylor St. at Webster, Trenton 4
Thermacote Co., 320 Jefferson St., Newark 5
Van Beek Industries, 23 Park St., Orange

NEW YORK
Bassons Molded Products, 1424 W. Farms Rd., New York 60
Copeland Displays, Inc., 537 W. 53rd St., New York 19
Curbell Inc., 1700 Elmwood Ave., Buffalo 7
Dual Fabricators Corp., 808 Driggs Ave., Brooklyn 11
Dura Plastics Inc., 1 W. 34th St., New York 1
Durable Formed Products, Inc., 329 Canal St., New York 13
Mastercraft Plastics Co., Inc., 95-32 150th St., Jamaica 4
Steiner Plastics Mfg. Co., 47-30 33rd St., Long Island City 1

OHIO
Fabri-Form Co., Box 36, Cambridge
The Baxter Company, 15 E. 2nd St., Cincinnati

PENNSYLVANIA
Halsen Mfg. Co., 5919 Webster St., Philadelphia
Lee Plastics, A and Lippincott St., Philadelphia 34
Pearson-Berlinghof, Inc., 18 North State St., Newton
The Bell Plastics Co., Inc., 600 Heinz St., Pittsburgh 12

TENNESSEE
Plasti-Line, Inc., Jacksboro & Broadway, Knoxville 18

TEXAS
Plastic Engineering Co., 2101 69th St., Houston 11
Plastic Products of Texas, 1400 Cedar Springs, Dallas

WASHINGTON
K. B. Plastics, Inc., 1817 So. 1st St., Yakima
Mason Plastics Company, 1121 Westlake North, Seattle

WISCONSIN
Midland Plastics, Inc., 227 N. Water St., Milwaukee 2

The United States Rubber Company at 2638 North Pulaski Road, Chicago, Illinois, has complete Engineering, Designing, and Styling Departments to assist fabricators on the technique to employ, and in the art of fabricating most efficiently with ROYALITE.

Plastic Molding
THAT SAVES LIVES

Yes, just that! The accuracy with which the earphones of this Aviator's Microphone Head-set is molded is what helps to make it possible for the pilot to bring the great ship home "on the beam". Such accuracy is paramount at KUHN & JACOB.

Inside view of molded parts, showing various plane surfaces and cavities. Clean, accurate molding such as this reflects skill in mold making and production.

Kuhn & Jacob
MOLDING and TOOL CO.
1200 SOUTHARD STREET, TRENTON 8, N. J.
Telephone Trenton 4-5391

CONTACT THE **K & J** REPRESENTATIVE NEAREST YOU

S. C. Ullman, 55 W. 42nd St., New York, N. Y.
Telephone — Penn 6-0346

Wm. T. Wyler, Box 126, Stratford, Conn.
Telephone — Bridgeport 7-4293

Wm. A. Chalverus,
Philadelphia, Penna.

Want to make your Plastics look like Metal?

Metaplast will do it! Pioneers in the field of metalizing quality products, Metaplast can provide your plastic pieces with bright metallic finishes. The effects are amazing.

We are equipped to metalize on plastics, metal and glass by all methods of coating.

Consult us for assistance with your problems. We'll show you how to get best results at lowest cost and how to adapt your product for our metalizing processes.

Metaplast will set you up for silver spraying via the Nitrate Method on your own premises. No license fees.

Factory and Office
9-17 37th Avenue, Long Island City 1, N. Y.

Laboratory
205 West 19th Street, New York 11, N. Y.

Metaplast
PROCESS, Inc.
PIONEERS OF MASS-PRODUCED METALIZING

SPECIAL SMALL EQUIPMENT
for plastic, optical, celluloid and allied industries

This Toggle Press rated at 4 tons with 100 lbs. of air. Made also as Foot Toggle. These presses, and several other sizes and styles of Hand Lever Presses, handle economically embossing, drawing, and degating jobs in plastic manufacturing concerns. Prompt delivery.

Specialists
in Injection Mold Making
also Transfer
and Compression Molds

STANDARD TOOL CO.
83 WATER STREET, LEOMINSTER, MASS.
Outfitters to Plastics Mfrs. Since 1911

OMNI PRODUCTS CORP., Export Distributors, New York, N. Y.

Literature display rack, of 0.090-in. thick copolymer sheet, has concealed frame permitting use of thin material

Copolymer Display Rack

ONE of the most recent additions to the list of products fabricated of Royalite copolymer sheet material is an attractively styled rack for displaying literature. Measuring approximately 29 in. long, 20 in. high, and 7 in. deep, the rack was designed by Palma-Knapp Associates, Chicago, Ill., and is manufactured by Arrem Plastics, also of Chicago, for Household Finance Corp. Hundreds of the racks are being used to display financial literature in the many HFC offices scattered throughout the country.

Material 0.090 in. thick is used in producing the display which is made by a combination vacuum and plug and ring technique, using an aluminum tool. The slots which hold the booklets are blanked out after the forming operation. A sturdy wire frame, concealed in the finished unit, provides additional strength and makes it possible to use relatively thin material in the manufacture of the rack.

The material employed in the HFC display is green in color and has a leather grain surface effect. The calendar section at the top, so designed that new calendar cards can be easily inserted, is formed separately, nine at a time. The silk screen lettering and HFC emblems at the bottom front of the display are produced in lime yellow and white colors.

HELPFUL FREE LITERATURE

EQUIPMENT • SUPPLIES • SERVICE

The literature and samples described here contain valuable data that will help increase the operating efficiency of your business.

After selecting the items you want, merely circle the corresponding numbers on the post card, fill in the information requested, and mail.

DEHYDRATING VINYL SHEETS. Application report on the use of Chromalox radiant heaters to dehydrate vinyl sheets prior to sandwiching between two panes of glass. Edwin L. Wiegand Co. **(8-800)**

LABELING IDEAS. Booklet containing hundreds of suggestions for labels of different sizes, shapes, and types for many common and unusual applications. Ever Ready Label Corp. **(8-801)**

PLASTICS MANUFACTURING FACILITIES. Booklet containing data on the injection molding, compression molding, and other manufacturing facilities for defense work available at Associated Plastic Companies, Inc. **(8-802)**

VINYL PLASTISOLS. Technical data sheet on the use of vinyl plastisols as fabric coating, unsupported film, dip coating, and other applications. Contains data on physical properties and chemical resistance. American Resinous Chemicals Corp. **(8-803)**

SPEED NUTS. Brochure showing many hints on applications of various styles of Tinnerman Speed Nuts used for a multitude of fastening jobs. Illustrated with many photographs and application drawings. Tinnerman Products, Inc. **(8-804)**

CORRUGATED PLEXIGLAS. Booklet illustrating architectural applications of corrugated Plexiglas sheet. Shows typical installation details for attaching Plexiglas in various types of installations. Rohm & Haas Co. **(8-805)**

SILICONE PRODUCTS. Booklet briefly describing GE dry film water repellents, silicone oils, silicone resins, silicone rubber compounds, and silicone rubber gums. General Electric Co. **(8-806)**

TITANIUM PIGMENTS. An attractive brochure describing Titanox titanium dioxide pigments and their uses and applications in coated fabrics, plastics, paints, etc. Many charts and diagrams. Titanium Pigment Corp. **(8-807)**

TOOL AND DIE MILLING MACHINE. Booklet highlighting the features and advantages of the new Cincinnati 8- by 18-in. tool and die milling machine for making forging dies, master hobs, plastic molds, die casting dies, and the like. The Cincinnati Milling Machine Co. **(8-808)**

COMPRESSION MOLDING HINTS. A pocket size booklet containing information on one molder's methods for overcoming various common compression and transfer molding difficulties. British Industrial Plastics Ltd. **(8-809)**

SUMP-TYPE LIQUID FILTERS. Folder containing operational and ordering data on Marvel Synclinal Filters for keeping hydraulic oil clean. Marvel Engineering Co. **(8-810)**

STABILIZER. Technical service report on Witco Stabilizer No. 70 a new cadmium-barium-type stabilizer for polyvinyl chloride type resins. Witco Chemical Co. **(8-811)**

THREE-SCREW EXTRUDER. Folder containing data about the production and specifications of R. H. Windsor's R-C-200 (lb. per hour) triple-screw extruder. R. H. Windsor Ltd. **(8-812)**

FIRESTONE VELON. Bulletin describing the various forms in which Firestone Velon film and yarn are available, their applications, and advantages are presented. Firestone Plastics Co. **(8-813)**

SYNTHETIC TANNING RESIN. Technical data sheet on Polyco 360 synthetic resin which induces maximum plumping of leather during tanning with minimum shrinkage. American Polymer Corp. **(8-814)**

COMPRESSION MOLDING PRESS. Bulletin on the specifications of compression molding presses from 50 to 500 tons manufactured by T. H. & J. Daniels, Ltd. **(8-815)**

MANUFACTURING POLYVINYL CHLORIDE. Magazine reprint containing information on how polyvinyl chloride is manufactured in one of the country's most modern production units. Naugatuck Chemical, Div. of U. S. Rubber Co. **(8-816)**

CEMENTING "LUCITE" ACRYLIC RESIN. Technical service bulletin telling how to make strong transparent joints in Lucite pieces. Data on procedure, cements, and avoidance of internal strains. E. I. du Pont de Nemours & Co., Inc. **(8-817)**

FLASH REMOVAL. Two bulletins, each giving a case history on removal of flash from compression molded parts by pelting with small non-abrasive particles. American Wheelabrator & Equipment Corp. **(8-818)**

HIGH SPEED MIXING. Folder containing four-color illustrations showing how the Entoleter centrifugal mixer makes homogeneous mixtures of styrene powders, pigments, etc. The Safety Car Heating and Lighting Co., Inc. **(8-819)**

STOCK VALVE HANDLES. Booklet containing description and size specifications of various stock valve handles available from Diemolding Corp. **(8-820)**

FABRICATING CELLULOSE ACETATE. Technical booklet describing the principal operations such as blowing, forming, stamping, heat sealing, etc., which are employed in fabricating cellulose acetate. Monsanto Chemical Co. **(8-821)**

Fill out and mail this card now

MODERN PLASTICS

Manufacturers' Literature Service

I am interested in the following items:

8-800 8-801 8-802 8-803 8-804 8-805 8-806 8-807 8-808 8-809 8-810
8-811 8-812 8-813 8-814 8-815 8-816 8-817 8-818 8-819 8-820 8-821
8-822 8-823 8-824 8-825 8-826 8-827 8-828 8-829 8-830 8-831 8-832
8-833 8-834 8-835 8-836 8-837 8-838 8-839 8-840 8-841 8-842 8-843

If you do not now subscribe to MODERN PLASTICS, but wish to receive the next 12 issues ($5 everywhere), just check here ☐

NAME ..... ***POSITION*** .....
(Please Print Plainly)

COMPANY .....

STREET ..... ***CITY*** ..... ***STATE*** .....

(Not Valid After November 1, 1951)

HELPFUL FREE LITERATURE

EQUIPMENT • SUPPLIES • SERVICE

The literature and samples described here contain valuable data that will help increase the operating efficiency of your business.

After selecting the items you want, merely circle the corresponding numbers on the post card, fill in the information requested, and mail.

TEMPERATURE REGULATOR. Booklet on the IMPCO No. 3 temperature regulator for maintaining accurate control of the temperature of injection molds. Improved Paper Machinery Corp. **(8-822)**

PEARL ESSENCE. Folder describing the processing of natural pearl essence and its employment to enhance various plastics. The Mearl Corp. **(8-823)**

AUTOMATIC STEAM BOILERS. Bulletin containing data on Kane gas-fired automatic steam boilers for supplying heat and pressure for molding presses. Mears-Kane-Ofeldt Inc. **(8-824)**

CRUSHERS AND MIXERS. Catalog containing bulletins on Sturtevant machines for crushing, grinding, separating, elevating, conveying, and mixing a wide range of products. Sturtevant Mill Co. **(8-825)**

PLASTICIZER SELECTION CHART. Handy chart indicating recommended Baker plasticizers for cellulose, vinyl, and other resins. The Baker Castor Oil Co. **(8-826)**

CELLULOSE ACETATE. Brochure containing data on the history of cellulose acetate, its characteristics, and sheet material and molding powders and the various products which can be made from them. Erinoid Ltd. **(8-827)**

THIXON BONDING AGENTS. Bulletin describing Thixon cements, adhesion boosters, and adhesion primers for bonding synthetic and natural rubber to any type of metal. Harwick Standard Chemical Co. **(8-828)**

PNEUMATIC STANDARDS. Reproduction in full—with sample circuit, glossary of terms, standard symbols, and other data—of recently adopted Joint Industry Conference standards for users of pneumatic machinery and equipment. Miller Motor Co. **(8-829)**

HERESITE CHEMICALS. Booklet containing data on the products of this company including modified phenolic coatings, transparent thermosetting compounds, laminating varnish, and various industrial protective coatings. Heresite & Chemical Co. **(8-830)**

PLASTICS MOLDING FACILITIES. Facilities for injection and compression molding in connection with the defense effort are discussed in a booklet issued by Prolon Plastics, Div. of Pro-phy-lac-tic Brush Co. **(8-831)**

FASTAX FILM. News letter containing information on special film for use in the Fastax camera for analysis of high speed motion. Wollensak Optical Co. **(8-832)**

REINFORCED PLASTIC BOXES. Reprint from MODERN PLASTICS on Fiberglas-polyester boxes fabricated from sheet stock. Data sheets and price lists on trays and tote boxes made from this material. Sample included. Molded Resin Fiber Co. **(8-833)**

MARKING MACHINES. Various Acromark nameplate and parts-marking machines are described with specifications and features on each. The Acromark Co. **(8-834)**

VINYLITE SURFACE COATINGS. Details on the applications and advantages of Vinylite resin surface coatings for metals, cloth, paper, etc., to make them long lasting, durable, weathertight. Bakelite Co., Div. Union Carbide and Carbon Corp. **(8-835)**

MACHINERY FOR THE PROCESS INDUSTRIES. Illustrated booklet describing Banbury mixers and mills (with tables of sizes and capacities); also extruders, calenders, etc. Typical schematic layouts are included. Farrel-Birmingham Co., Inc. **(8-836)**

COLORING OF POLYETHYLENE. Leaflet containing a discussion of the methods and pigments used to color polyethylene materials during molding or extrusion. Ferro Enamel Corp. **(8-837)**

FORMICA IDEAS. Full-color folder illustrating a variety of designs for a Vanitory (combination lavatory-vanity unit for homes), together with suggested construction details. Explanation of the construction of Formica decorative plastic laminates and other uses are also listed. The Formica Co. **(8-838)**

MOLDING POWDERS. General properties and uses of various thermoplastic molding powders are listed in this full-color illustrated booklet. A key chart of standard styrene colors is included. Gering Products, Inc. **(8-839)**

SCALES. Described in this broadside folder are a wide range of weighing scales, many of which have numerous applications in the plastics industry. Toledo Scale Co. **(8-840)**

"FLEXOL" PLASTICIZER DHP. Technical information bulletin about a plasticizer which is suggested for use with vinyl chloride and copolymer resins, polyvinyl acetate resins, and nitro cellulose plastics. Carbide and Carbon Chemicals Corp., Unit of Union Carbide and Carbon Corp. **(8-841)**

DIRECT FLOW PUMPS. Data sheet on the Aldrich 6 in. stroke direct flow pump series for providing pressure for plastic molding and laminating. The Aldrich Pump Co. **(8-842)**

DEFENSE OPERATION. News bulletin demonstrating what is being done by one molding machine manufacturer to produce and deliver a larger volume of equipment for the defense effort and regular customers. F. J. Stokes Machine Co. **(8-843)**

Fill out and mail this card now

Postage Will Be Paid by Addressee

No Postage Stamp Necessary If Mailed in the United States

BUSINESS REPLY CARD

First Class Permit No. 2656 (Sec. 34.9, P.L. & R.), New York, N.Y.

MODERN PLASTICS

575 Madison Avenue

NEW YORK 22, N. Y.

Polyethylene insert in bottle retards flow of nail polish when bottle tips

Bottle Insert

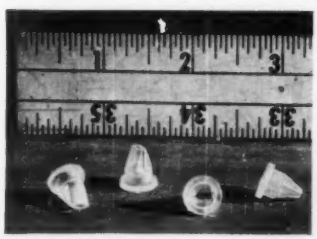
MANY a dress has been stained and many a table top marred because of a tipped-over bottle of nail polish. Such accidents are prevented by polyethylene inserts which make nail polish bottles spillproof.

The cone-shaped insert, on which a patent is pending, was developed by Leo L. Kellett of Lac-R-Loc Co., Kansas City, Mo. It is molded by Lumelite Corp., Pawling, N.Y.

The insert has a restricted opening which prevents the flow of the viscous liquid long enough to allow the user to right the container. An oval opening in the tapered end of the insert also wipes excess polish off the brush when the brush is withdrawn from the bottle. Just enough polish is left on the brush to cover one fingernail. The bottle top thus is prevented from getting sticky.

Avon Allied Products, Inc., New York, N.Y., was the first company to incorporate the insert in a nail polish bottle. Northam Warren Corp., New York, N.Y., has recently incorporated the Lac-R-Loc in its Spillpruf bottle for Cutex polish.

Cone-shaped inserts are about ½ in. long; 2360 pieces weigh a pound



SIZE

...and the skill to use it wisely!

MANUFACTURED BY JACKSON AND CHURCH COMPANY SAGINAW, MICHIGAN

A new heavyweight in the Watertown production line that means . . . larger integral moldings, faster molding cycles, lower costs, flexibility of application and top volume output.

This new 64 oz. injection press is another in a long line of very good reasons for calling on Watertown when you're faced with the problem of selecting the right custom molder for that big, important job.

Take advantage of this more than efficient mating of trained, capable minds and a smooth functioning, versatile machine . . . a combination with the proven ability to deliver any type of large, one-piece housing, cabinet or panel requiring thermoplastic materials. Molding your part in one piece might well be the answer to the high cost of sub-assembly procedures.

At Watertown you'll always find the perfect production situation . . . constantly improving and expanding plant facilities, skillfully applied under experienced supervision.

If you have a particular part or product in mind, call on Watertown for the engineering facts and cost data. If your specifications are complete, drop a copy in the mail today for price quotation and delivery information. . . . No obligation, naturally.

WATERTOWN
MANUFACTURING COMPANY
1000 ECHO LAKE ROAD
WATERTOWN, CONNECTICUT

SINCE 1915

Norgren MICRO-FOG LUBRICATORS

RELY ON

ACE PRECISION

NYLON BALLS

FOR EXACT CONTROL

SIZES 1/8" — 3/4"

TOLERANCES ±.001

C. A. Norgren Co., Denver, Colorado, uses Ace Nylon Balls as feed tube checks in Micro-Fog Lubricators to provide instant oil flow.

Ace Nylon Balls of DuPont Nylon FM #10001 are mass produced to close tolerances giving you the advantages of toughness at low temperatures, form stability at high temperatures, light weight, chemical and abrasion resistance.

Hundreds of Industrial Applications! Let our engineers advise you.

Request samples and bulletin TODAY.

ACE HIGH QUALITY

ACE PLASTIC COMPANY

Precision Plastic Fabricators

91-18 Van Wyck Blvd. ● Jamaica 2, N.Y.

ORGANO-TIN COMPOUNDS

AVAILABLE • ON CERTIFICATION

DIBUTYL TIN DIACETATE
DIBUTYL TIN DICHLORIDE
DIBUTYL TIN DILAURATE
DIBUTYL TIN OXIDE
DIBUTYL TIN MALEATE

THESE standard M & T chemicals are subject to only a few minor end-use restrictions. For most uses they are freely available on certification.

New production capacity, recently put into operation assures a more plentiful supply than heretofore.

If tin chemicals or tin in any form have a place in your manufacturing or processing, we may be able to help you save scarce materials or to get better results from those in short supply. Write today.

METAL & THERMIT CORPORATION

100 EAST 42nd STREET, NEW YORK 17, N. Y.

Specialists in Tin and Tin Chemicals

Photos courtesy Bakelite Co.

Frame, head-piece, and one-piece lens for safety glasses are made of vinyl

Safety Goggle

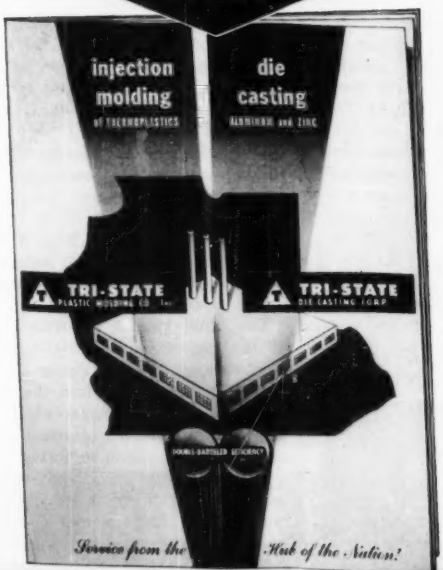
PROTECTION against a variety of industrial hazards is provided by a new type of safety goggle with one-piece interchangeable lenses. The frame, molded of Bakelite vinyl, is durable, easily cleaned, and resistant to acids, alkalies, and most chemicals. It is pliable at all normal temperatures, and effects a tight seal against the face for protection against acid splashes, dusts, and flying objects.

The one-piece lens, made of clear Vinylite, is resistant to chemicals and is interchangeable with other types of lenses. United States Safety Service Co., Kansas City, Mo., produces the goggles, which can be worn over prescription glasses.

Three types of frames are available: with regular vents for general use and protection against impacts; with screened vents for protection against splashes and dust; and with no vents for protection against splashes, fumes, and dust.

Vinyl lens interchanges with other lens types, can be worn over regular glasses

New Facilities Folder
NOW READY!



Write TRI-STATE, HENDERSON, KY., or Offices in New York, Chicago, Los Angeles

Can you use these
FACILITIES
for low-cost
SPRAYING

• assembly • fabricating
• hand painting • silk screening

Make use of the finest assembly facilities available in the East...and save money by doing so. Let Nordan package and drop ship for you... build your models...help develop your products.

17 fully equipped spray booths
13 conveyor belts
40 airbrush and paint specialists
special department for making electro formed spray masks

facilities for defense work
For any plastics assembly job, contact Nordan now

NORDAN PLASTICS CORP.
397 Bridge Street • 26 Front Street
Brooklyn 1, New York

PRODUCTION GOES UP
COSTS GO DOWN
WHEN
NIBRO-CEL®
IS USED FOR LAMINATES!

NIBRO-CEL, a scientifically processed saturating paper, is unexcelled for uniform absorbency and resin pick-up. This means higher production, fewer rejections and lower costs for you.

NIBRO-CEL is ideally suited for use in the manufacture of decorative laminates for table tops, counter tops, bars, partitions, panels and wall surfacing. And because of Brown Company's complete control of the manufacture of NIBRO-CEL from raw material to finished product, you'll find all of these additional characteristics in each sheet of NIBRO-CEL:

- **Uniform Formation**
- **Even Caliper**
- **Smooth, Level Surface**
- **Great Impact Strength**
- **Excellent Punching and Milling Qualities**

It will pay you to write for further information about NIBRO-CEL. Brown Company's Technical Service Division will work with you on your problems. Address Dept. MP-8.

A PRODUCT OF QUALITY BROWN *Company*

Berlin, NEW HAMPSHIRE

GENERAL SALES OFFICES: 150 CAUSEWAY STREET, BOSTON 14, MASS.
Branch Sales Offices:
Portland, Me., New York, Chicago, St. Louis, San Francisco, Montreal

SOLKA & CELLATE PULPS • SOLKA-FLOC • NIBROC PAPERS • NIBROC TOWELS • NIBROC KOWTOWLS • BERMICO SEWER PIPE, CONDUIT & CORES • ONCO INSOLES • CHEMICALS

WOULD YOU LIKE THESE BOOKLETS FREE?

DEHYDRATING VINYL SHEETS. Application report on the use of Chromalox radiant heaters to dehydrate vinyl sheets prior to sandwiching between two panes of glass. Edwin L. Wiegand Co. **(8-800)**

SPEED NUTS. Brochure showing many hints on applications of various styles of Tinnerman Speed Nuts used for a multitude of fastening jobs. Illustrated with many photographs and application drawings. Tinnerman Products, Inc. **(8-804)**

FLASH REMOVAL. Two bulletins, each giving a case history on removal of flash from compression molded parts by pelting with small non-abrasive particles. American Wheelabrator & Equipment Corp. **(8-818)**

PLASTICIZER SELECTION CHART. Handy chart indicating recommended Baker plasticizers for cellulose, vinyl, and other resins. The Baker Castor Oil Co. **(8-826)**

MOLDING POWDERS. General properties and uses of various thermoplastic molding powders are listed in this full-color illustrated booklet. A key chart of standard styrene colors is included. Gering Products, Inc. **(8-839)**

Any of the booklets described here plus many others—forty-four in all—are available for the asking without charge or obligation.

Just turn to the Manufacturers' Literature page in this issue (it's printed on heavy colored paper), circle the numbers corresponding to the booklets you want, fill in the reply postcard, and mail. No postage needed.

We'll see that you get the literature you request promptly.

A SERVICE OF

MODERN PLASTICS

A BRESKIN PUBLICATION

575 MADISON AVENUE, NEW YORK 22, N. Y.

Vinyl Door Gaskets

CONTINUOUS development of temperature control in refrigerators has required constant improvement of door gaskets. With the replacement of natural rubber gaskets by Geon vinyl gaskets on the doors of 1951 refrigerators made by The Westinghouse Electric Appliance Div., Mansfield, Ohio, another advance in design has been achieved.

Reduced wear and tear and consequent savings to consumers in replacement costs are the principal benefits of this changeover. Many factors contributed to the switch from rubber to vinyl. Whereas crude rubber cracks and grows brittle with age due to oxidation, vinyl retains its resiliency and will not crack under normal conditions. Again, while rubber gaskets have been found to be affected by solvents, greases, and even perspiration, Geon vinyl resists these agents as well as oil, fats, waxes, and household chemicals.

Formerly, deterioration in rubber gaskets required replacement at from one- to five-year intervals. On the other hand, tests of hundreds of vinyl gaskets over a 10-year period disclosed no instances where replacement was necessary due to deterioration or failure.

The vinyl gasket, approximately 10 ft. long, is extruded to form a "balloon" and a "tail"; the lip of the inner door panel fits into the tail, and only the balloon remains visible. The flexibility of the plastic gasket enables it to conform to surface irregularities, thus providing a seal of maximum durability. Moreover, it is claimed that the "softness" and pliability of vinyl makes possible more rapid door assembly on the production line.

Numerous tests have been conducted to confirm the effectiveness of the vinyl gasket seal. In one case, refrigerator doors equipped with Geon gaskets were opened and closed over one million times—without showing any apparent wear. In another test, both rubber and vinyl gaskets were submitted to "stressed light" for 500 hr. in a Fade-Ometer; where rubber discolored and cracked, vinyl showed no effects from exposure.

The evolution of such gaskets is traced from the cord and oil-cloth type used on pre-mechanical iceboxes. "Wirf" strips were tacked on wood door frames of early electric refrigerators, later gave way to the natural rubber varieties.

Photos this page courtesy B. F. Goodrich Chemical Co.

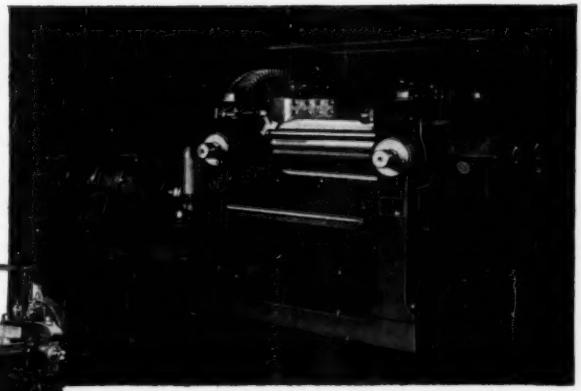
Operator assembling vinyl door gasket to inner door panel of a refrigerator

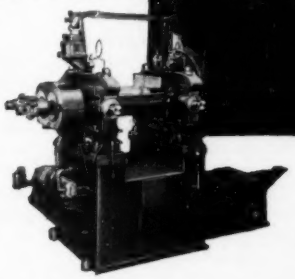
Rubber gaskets, first and third, are discolored by light test; vinyl gaskets, second and fourth, are unaffected

Refrigerator door gasket evolution. Left to right: "Wirf" type; an original rubber gasket; two black rubber styles; early gray rubber gasket; later gray model; new vinyl gasket

MIXING MILLS
for Plastics . . .

Here is the product of nearly a half century's experience in designing and building mixing mills of all sizes to meet the specifications of rubber and plastics plants. From design straight through to finished machine ready for operation National-Erie controls production within its own complete plant. Your specifications will be met accurately and promptly here.





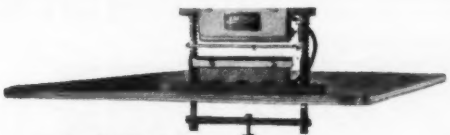
ABOVE: NE special Mixing Mill 16" x 16" x 36" designed for Plastics with air operated doctor knives and base for floor level mounting.

LEFT: 8" x 8" x 16" Plastic mill with doctor knives and circulating lubrication system.

Complete Rubber and Plastics Working Machinery

NATIONAL ERIE CORPORATION

ERIE, PENNSYLVANIA • U. S. A.



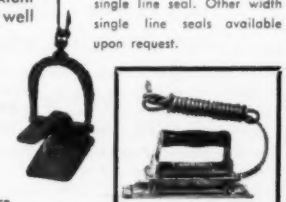
AMSCO
foot operated
BAG SEALERS

for
POLYETHYLENE
and Similar Materials

Features an entirely new *heat sealing development that produces a perfect weld regardless of the pressure applied or extent of time. Works equally well on all plastic and plasticized films. The danger of bag material sticking to the sealing jaws has been eliminated.

*Pat. Pend.

Three models—7", 14½" and 22" length sealing jaws — built for years of efficient, trouble-free use. Standard sealing surface is ⅛" wide single line seal. Other width single line seals available upon request.



AMSCO HAND SEALER
for package wrapping with Polyethylene, Pliofilm and Plasticized Films.

Write Dept. MP for literature.

Amsco

JOBBER INQUIRIES INVITED
PACKAGING MACHINERY, INC.
31-31 49th Avenue
Long Island City 1, N. Y.
Specialists in Diversified Packaging Equipment.

BUSHINGS • CASTERS • BASES • GEARS • HOUSINGS • COVERS

FIBERITE

Phenolic ***Melamine***

Impact Molding Compounds

GENERAL TYPES	APPLICATIONS
Flock	Lower Impact
Fibrous	Delicate inserts, thin walls
Light Fabric	Resiliency, Moldability, high strength
Heavy Fabric	Industrial & heavy duty
Cord	Highest impact

Controlled Flow. Grades available for compression, transfer and plunger molding. All materials produced in bulk or high density custom-made preforms, Eastern and Midwestern representation.

Address inquiries to:

FIBERITE ***Corporation***

516 West Fourth Street
Winona, Minnesota

GUN GRIPS • PULLEYS • CAPS • CASES • CAMS • TRAYS

Laminates

(*Continued from pp. 73-79*)

outer surface to hold the wires of the coil in position. Open slots are machined in the ends. Because of the nature of the laminate, all machining must be done by grinding.

Many difficulties were encountered when this tube was first in pilot production. Porous areas and voids were discovered in the laminate, which led to a novel method of testing for delamination, porosity, and, in fact, for any non-homogeneity. The tube is first placed over a metal mandrel, which is connected to one terminal of a high frequency, high voltage spark coil. The second terminal of the coil is connected to a probe. When the probe is passed over the outer surface of the laminated tube, the spark spreads over the surface of the tube and dissipates in the air if the portion of the tube being tested is satisfactory. If a void is encountered, the spark will establish a corona effect which is a different color from the spark. The corona thus clearly establishes the location and extent of the void. Of course, if there were a hole completely through the tube, the spark would jump directly through to the metal mandrel.

Numerous tests by Federal have shown that the only laminated material which would have the properties required for this coil form was silicone-glass. It must stand up under the shock of a broadside on a battleship; it must withstand a wide range of temperatures; at the same time, its electrical properties must be excellent over a broad band of frequencies.

Atomic Research

Laminates are even playing a part in atomic research. At Brookhaven National Laboratory, Upton, L.I., N.Y., devoted to long-term, fundamental studies of atomic energy, a large atomic accelerator is being constructed to accelerate atoms to an energy of two billion electron volts. Called the Cosmotron, it gets its name from the fact that it will produce particles as energetic as some cosmic rays. When completed, it is expected to speed protons to an energy five times greater than that attained by any existing cyclotrons.

The purpose of the Cosmotron is to determine what occurs when these particles—moving with two-billion-volt energy—collide with atoms of other elements, such as hydrogen, copper, or lead. Scientists thus hope to learn more about the forces which bind together elementary particles.

Heart of the Cosmotron is a 2200-ton magnet, which is responsible for keeping the super-accelerated particles on course. And for insulation of this giant magnet, which is really a ring made up of 288 sections, the Cosmotron relies on laminated plastics. Component magnets in the assembly resemble octagonal slabs, each with a U-shaped slot. At the base of the slot is the laminated plastic gap insulator, which is produced by a combination of molding and post-forming processes.

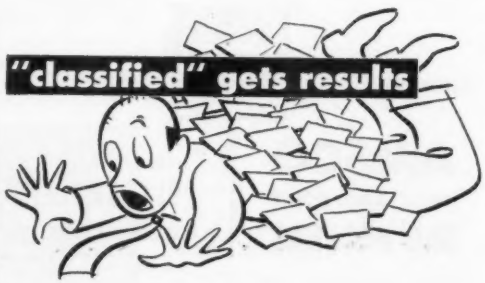
Design of these gap insulators calls for a U-shape section approximately 8¼ in. wide by 7 in. deep, with legs 11½ in. long. Both faces have flanges varying from 1¾ to 3 in. wide. Engineers of Formica solved the problem of producing the desired contours by post-forming the basic U-shaped section, molding the

Cady Exact Micrometers
For Inspecting, Checking, Comparing Thicknesses Of
Plastics Stock or Finished Pieces

Dead Weight Model Standard Model Portable Model

Extremely accurate, graduations: 1/1000ths and half-thousandths inch; glass covered dials; flat end or spherical end anvils available. Used by makers, molders, fabricators, buyers and sellers of plastics and plastics products. Capacity: sheets, rods, pieces to ½" thick, 7", 12", or 18" throat available on standard model. Built for lifetime service; 3 popular models; reasonably priced.

E. J. CADY & COMPANY, Micrometer Mfrs., 134 N. LaSalle St. Chicago 2, Illinois
Send complete information and prices on Cady Micrometers
Name .....
Company .....
Address .....



With D.O.'s bringing about re-organizations everywhere, there is probably a better market for your used equipment at the present moment than at any time during the past two years.

Check the inexpensive rates on "classified" on page 202 of this issue. It will pay you to convert your used equipment into cash now. Write . . .

Classified Advertising Department

MODERN PLASTICS
575 Madison Avenue New York 22, N.Y.

NOW HAND ENGRAVE BY MACHINE

ON SOFT METALS SUCH AS BRASS. COPPER. NICKEL-SILVER. DIE CAST METAL. Etc.

To operate just follow the grooves in the letters you set up on the copy table.

"Easy as tracing a drawing"

PANTO

WRITE FOR DATA CNP

H. P. PREIS ENGRAVING MACHINE CO.
653 Route 29, Hillside, N. J.

BAG PRODUCTS...

Send Today for Bulletin No. 8-31

Easy to Use..Low in Cost

Designed to handle bagged products with a minimum of effort at a maximum speed. Simple adjustments for height . . . tilting forward or backward enables operator to set machine at easiest position. Stainless steel trough with capacity of 200 bags. Adjustable to bag sizes. Blower keeps bag clean and free from foreign matter.

Anderson BROS. MFG. CO.

ANDERSON BROS. MFG. CO., ROCKFORD, ILLINOIS

AMPACET®

CELLULOSE ACETATE AND ETHYL CELLULOSE

FOR YOUR

DEFENSE ORDERS

As manufacturers of prime thermoplastic molding compounds we are geared to fulfill the most rigid specifications. Also, our large plant facilities enable us to cooperate efficiently with customers' special requirements for storage and drop shipping.

FOR INJECTION MOLDING
FOR EXTRUSION

Available in crystal clear transparent and all colors — transparent, translucent and opaque.

We also custom compound *all* thermoplastics to your specifications.

AMERICAN MOLDING POWDER and CHEMICAL CORP.
AN AFFILIATE OF A. BAMBERGER CORPORATION
703 BEDFORD AVENUE, BROOKLYN 6, N. Y.
Phone: MAin 5-7450 Cable: Chemprod Brooklyn

flange, and then assembling the whole insulator with a special phenolic adhesive. The material is a cotton-base phenolic and has met all requirements for dielectric strength and mechanical properties. The post forming is carried out by flash heating the material at 500° F. for from 45 to 90 sec., then forming the hot material over dies.

These laminated plastic gap insulators recently passed their first tests with flying colors when the Brookhaven Cosmotron magnet was subjected to full power testing at 40 million watts.

Refrigeration

There are many applications in the refrigeration field which make use of high pressure laminates, although the development of styrene copolymer material and of large injection molding machines have switched many of these parts to styrene. Despite the extent of this changeover, a very considerable tonnage of laminate is still being used in this field. For example, an important percentage of the capacity of the General Electric plant at Coshocton is still going into refrigeration components. While such items as breaker strips are being widely converted to styrene, the Coshocton plant is still producing tremendous quantities of such strips in laminate. Company spokesmen claim that the reason for this is that the plant can produce these strips more economically by laminating than they can be produced by injection, to date.

The one important refrigeration plastic component which is still practically 100% laminate is the inner door liner and, according to executives at Coshocton, the only material which is competing pricewise today is porcelain-enameled steel.

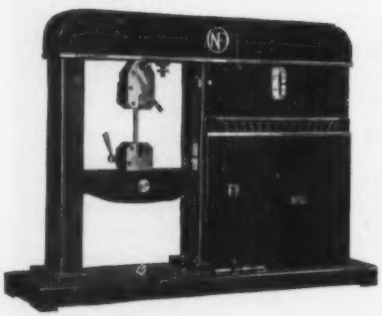
A look at the economics of the laminated liner tells the story. Paper at 7 to 8¢ per pound and phenolic varnish at around 28¢ a pound are used in approximately 60:40 ratio. This gives an average material cost for laminate of about 16¢ per pound. The general impression that the over-all cycle for producing molded laminate liners is quite slow is proved fallacious by the production rate at Coshocton. Here one multiplaten laminating press with two operators produces over 150 inner door liners per hour. There is still the cost factor of finishing and painting. Removing the flash from the laminated liner is very simple, because the process is completely mechanized. So is painting. The Coshocton plant is set up so that the painting of these liners is completely automatic, the only labor required being that of clamping the unpainted liner onto a conveyor at the beginning of the operation and removing it at the end.

Other Uses

Obviously, every application of high pressure laminates in the textile, electrical, and refrigeration industries has not been covered here. Neither has it been possible in every case to describe the work of every company on a given type of application. However, the variety indicates the trends, points out the possibilities. Also, there is a broad field of usefulness for laminates in mechanical applications merely hinted at above. These will be detailed in a second article on the industrial laminates to be published next month.—END

In TESTING

DEPENDABILITY-SIMPLICITY-ECONOMY



Model TMU Only 44 in. High 30,000 or 15,000 lbs. Capacity

A compact, modern universal testing machine. Tension, compression, flexure tests at A.S.T.M. accuracy. Infinitely-variable speed. Ball bearing pulling screws and nuts give fluid-smooth operation at all speeds. Built for hard service.

Prompt Deliveries of Few Units Remaining in Stock

For Details, Write for Brochure 501

Testing Machine Division

NATIONAL FORGE AND ORDNANCE CO.

Dept. PM, Irvine, Warren County, Penna.

Lind

PLASTIC PRODUCTS

CUSTOM MOLDING!

The plastic tableware you see illustrated here has been carefully molded to exact specifications . . . reinforced throughout to give the feel and service of regular silverware both in size and shape.

But this is conventional type design . . . We CUSTOM MOLD delicate designs, novel designs and unusual designs . . . many of our customers have us mold their intricate trademarks, slogans and logotypes into this plastic tableware and they're very particular about the finished product too!

• • •

When your ideas demand plastic products of ANY TYPE where **precision is your hallmark and low cost your goal.**

REMEMBER

LIND PLASTIC PRODUCTS

Specialize In Custom Molding

4451 W. Rice Street

Chicago 51, Illinois

Lind PLASTIC PRODUCTS

No cause for alarm*

Drop it... scrape it... bump it... sit on it! But don't concern yourself about its welfare! This luggage is made with a *Fiberglas reinforcement!*

Created by H. Koch & Sons, San Francisco, this Fiberglas-reinforced luggage is lighter than aluminum . . . stronger than steel. Molded-in colors are rainbow-bright and stay that way through years of the toughest travel. In fact, the Association of Baggage Traffic Managers has recommended it as the only baggage that can be safely checked *without a protective cover!*

Alert manufacturers are using this rugged new material to make a host of civilian and military products, such as washing machine parts, fishing rods, boats, furniture, tote boxes, military instrument cases, and aircraft components . . . wherever light weight, durability, resistance to age, weather, water, acids and oils are a *must.*

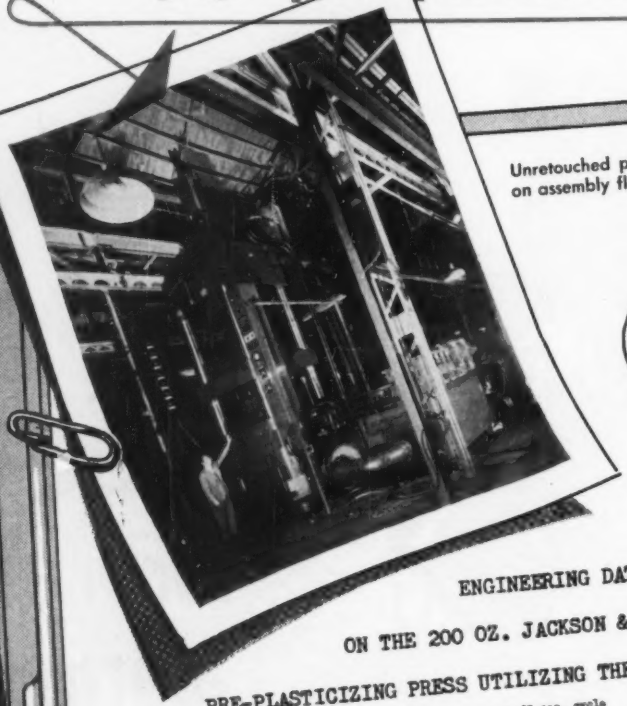
Investigate Fiberglas reinforcements for yourself. For further details write: Owens-Corning Fiberglas Corporation, Reinforced Plastics Division, Department 125, 16 East 56th Street, New York 22, N. Y.

* IT'S PLASTIC, REINFORCED WITH OWENS-CORNING FIBERGLAS *Yarns*

(*Fiberglas is the trade-mark (Reg. U. S. Pat. Off.) of Owens-Corning Fiberglas Corporation for a variety of products made of or with fibrous glass.

FIBERGLAS IS IN YOUR LIFE... FOR GOOD!

J-C pre-plasticizing press



Unretouched photo of 200 oz. press on assembly floor at Jackson & Church

Hendry PRE-PLASTICIZING PROCESS J-C JACKSON & CHURCH CO Saginaw Michigan

ENGINEERING DATA

ON THE 200 OZ. JACKSON & CHURCH

PRE-PLASTICIZING PRESS UTILIZING THE HENDRY PROCESS

CAPACITY	208 oz. of polystyrene on 30 sec. cycle
POTENTIAL CAPACITY	300 oz. at 45 sec. cycle with substitution of 300 oz. chamber
PLASTICIZING CAPACITY	1200 lbs./hr. (1000 lbs./hr. on continuous basis)
SPEED OF INJECTION	180" per minute minutely flow-controlled down to 10" to 15" per minute
CLAMPING PRESSURE	2000 tons
INJECTION PRESSURE	100 tons
SPEED OF UNIT	410" a minute going up -- 475" a minute coming down (slowed up at both ends for clamping and knock-out)
WEIGHT	135 tons exclusive of oil
CAPACITY OF OIL RESERVOIR	1600 gallons
SCREW DIMENSIONS	6" diameter, 110" long
HEAT (electrical)	51,600 watts split among six thermo-couples controlled by Wheeloo Regulators plus an additional 2400 watts on nozzle controlled by separate Wheeloo
TEMPERATURE CONTROL ZONES	Seven on 200 oz. machine
OPERATION OF INJECTION RAM	1000 lb. line pressure driven forward with 122 gallons of oil per minute to develop 10,000 p.s.i. on material in chamber
DRIVES	Hydraulic unit powered by 75 H.P. 1200 R.P.M. General Electric motor. The Extruder Clutch is powered by a 75 H.P. 1800 R.P.M. General Electric Motor.
CLUTCH	Eddy Current Clutch - water-cooled; rated horsepower capacity - 85 H.P. with instantaneous starting and stopping
PLATEN SIZE	73" x 73" square; 48" x 48" between the rods; mold size 73" x 48"

...opens new markets

for larger plastics parts!

Household furniture, complete lighting units, display fixtures, industrial parts...larger and heavier plastic products are made possible by this revolutionary J-C press.

The J-C 200 oz. pre-plasticizing press makes it possible and practical to inject uniformly plasticized material directly into the mold without torpedoes, auxiliary plungers or other supplementary devices.

Through the use of frictional heat in conjunction with resistance heat, the J-C Press supplies constant viscosity material rather than erratic temperature material to the injection chamber. There is but one viscosity for a given plastic material while there are many temperatures at which some form of injection molded parts can be obtained. The injection of constant viscosity material through the use of the J-C Press results in less injection pressure... more projected area per ton clamping pressure...more strain-free moldings...less scrap!

On every type of plastic tried to date, the pre-plasticizing equipment on the press has permitted coloring and molding in one operation. No longer is it necessary to compound, pelletize or treat pre-molded materials...simply augment crystals with small quantities of required dye, dry mix, and run through the J-C Press for total diffusion of color.

J-C 200 OZ. PRE-PLASTICIZING PRESS...POTENTIAL CAPACITY

300 OZ. AT 45 SEC. CYCLE WITH SUBSTITUTION OF 300 OZ.

CHAMBER...FIRST INJECTION MOLDING MACHINE CAPABLE OF

PLASTICIZING 1000 POUNDS OF STYRENE PER HOUR ON A

CONTINUING BASIS!

J-C

A PRODUCT OF

JACKSON & CHURCH CO. • SAGINAW, MICHIGAN

WORK WELL DONE SINCE '81

Consult Waterbury for MOLDED PLASTICS

Creative Service in Product Development

Research, Design, Engineering.
Compression, Transfer, High Speed, Injection and Low Pressure Molding.
Over a Century of Fine Tool and Mold Work.
Finishing, Assembling.

PRODUCERS OF PLASTIC CONTAINERS FOR MANY WORLD FAMED PRODUCTS

SALES OFFICES

NEW YORK 17, N.Y.
17 East 42nd St.
BOSTON 11, MASS.
99 Chauncy St.
CHICAGO 6, ILL.
223 W. Jackson Blvd.
PHILADELPHIA 3, PA.
117 South 17th St.
ROCHESTER 5, N.Y.
L. W. Sage, Inc.
33 University Ave.
DETROIT 7, MICH.
Wm. Robert Wilson & Associates
6460 Kercheval Ave.

Our technical staff will gladly confer with you.

Write for Waterbury Plastics Catalog "M"

WATERBURY COMPANIES, INC.
Waterbury, Conn.

Properties

(*Continued from pp. 113-124*)

a macerated-fabric-filled phenolic plastic described in Table V.

Three sets of specimens, mounted on racks at an angle of 45° facing south, were exposed for 1 year to outdoor weathering on the roof of Industrial Building, National Bureau of Standards. The flexural properties were determined for one set, and weight and dimensions on a second set. The second and third sets were returned to the roof for another year's exposure. At the end of the second year the weight and dimensions and the flexural properties were determined on these additionally exposed specimens.

In the accelerated weathering test consisting of alternate exposure to ultra-violet light and misty atmosphere (Federal Specification L-P-406a, Method No. 6021), one set of specimens was used to measure changes in weight and dimensions. A second set of specimens was used to determine flexural properties after exposure to the accelerated weathering test for 120, 240, 360, and 480 hr., respectively.

The accelerated weathering test made in accordance with Method No. 6023 of Federal Specification L-P-406a involves exposure to cycles of soaking, freezing, drying, and radiation rich in ultra-violet light. The conditions used in this test are as follows:

a) 24 hr. at 100° F. over water; b) 4 hr. at −70° F.; c) 16 hr. at 160° F.; d) 4 hr. of exposure to ultra-violet radiation.

The five accelerated service tests involved exposure to cycles of temperatures from −40 to 175° F., and relative humidities from less than 5 to 100 percent. These accelerated service tests were made in accordance with the procedures described in Method No. 6011, Federal Specification L-P-406a. The conditions included in these tests represent a start toward establishing a group of test procedures for determining the effects of changes of atmospheric temperature and humidity upon plastic products. The significance of these procedures, insofar as correlation with actual service performance is concerned, has not yet been established; however, they are being used by the plastics industry and government agencies in the evaluation and procurement of materials.

The conditions used in the tests are shown in Table VI. In each of the tests the weight and dimensions of one set of specimens were measured after the conclusion of 1, 3, 5, and 10 cycles. The flexural properties were determined on other sets at the end of 5 and 10 cycles.

Changes in weight and dimensions and in flexural properties were the criteria used in analyzing the data

Table X—Changes in Weight and Dimensions of Laminated Plastics After the Cyclic Fuel-Immersion Test[a]

NBS material designation	Change[b] in weight in:			Average[b] of length and width changes in:			Change[b] in thickness in:		
	Heptane	Toluene	SR-6	Heptane	Toluene	SR-6	Heptane	Toluene	SR-6
	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)
Lignin paper									
D	0.08	0.52	0.06	0.02	0.05	0.00	0.3	0.2	−0.1
Phenolic; high-strength paper									
C	0.09	0.42	0.01	0.00	0.01	−0.01	0.1	0.0	−0.1
S	0.10	0.35	0.04	0.02	0.04	−0.04	0.2	0.2	0.1
Phenolic; cotton fabric									
J (Grade L)	0.07	0.42	0.01	0.02	0.05	−0.01	−0.1	0.1	−0.1
I (Grade C)	0.10	0.56	0.02	0.01	0.05	−0.02	0.2	0.0	−0.8
W (Grade C)	0.14	0.85	0.05	0.04	0.07	0.02	0.1	0.0	−0.3
L (Grade C; low pressure)	0.26	0.88	0.14	0.03	0.09	−0.03	0.5	0.1	1.6
Phenolic; rayon fabric									
Z	0.34	0.33	0.32	0.04	0.05	0.04	0.0	0.2	0.0
Phenolic; asbestos fabric									
K	0.16	0.83	0.20	0.02	0.05	0.03	0.0	0.2	0.5
Melamine; cotton fabric									
M	0.16	0.65	−0.03	0.03	0.08	−0.03	0.1	0.4	−0.2
Unsaturated polyester; cotton fabric									
F	0.09	0.54	0.00	0.02	0.08	−0.03	0.0	0.3	−0.4
H	0.19	0.60	0.04	0.04	0.09	0.01	0.1	0.2	−0.1
N	0.49	2.83	1.54	0.11	0.14	0.16	0.4	2.3	1.2
Unsaturated polyester; glass fabric									
E	0.09	0.30	0.14	0.00	−0.02	0.00	0.0	0.5	−0.4
X	0.08	0.08	0.08	0.01	0.01	0.01	0.0	−0.1	−0.1
Y	0.12	0.20	0.16	0.01	0.01	0.01	0.1	0.3	−0.4
AA	0.00	0.29	0.06	0.00	0.00	0.01	0.7	0.6	0.2
AB	0.17	0.21	0.19	0.03	0.01	0.03	0.2	0.0	0.1

[a] Each cycle of the test consists of a 24-hr. immersion and a 24-hr. drying period. Weight and dimensional measurements were made after 10 cycles of testing and reconditioning at 77° F. and 50% relative humidity for 48 hours. [b] Based on average value for two specimens.

SPRAY PLATE and Promote a Winner!
BY THE VACUUM OR NITRATE METHOD

Our plating of gold, silver and pastel colors will improve the appearance and durability of your product. This enables you to produce and promote money-making items. Our plating is highly effective on small metal and plastic items such as combs, novelties, brooches, clips, sprays, earrings and other plastic jewelry.

Inquiries are welcomed and samples are processed immediately free of charge. Send us samples of your products for plating in lots of twelve.

mirro-plex, inc.
160 FIFTH AVENUE • NEW YORK 10, N. Y.
WAtkins 9-3030

"FINISHES THAT SPARKLE"
No Government Curtailment on Materials Used

OK'd
APPROVED
for the
TOUGHEST JOBS
by **LEADING**
PLASTIC
MANUFACTURERS

Everyone agrees on the Model 6002 Mold Temperature Control Unit — the new self contained dual unit consisting of two independent heating, cooling and circulating systems in a single portable unit. Exclusives include high hose connections, fast water circulation, easy to see and reach controls and dials, plus modulating cooling controls. Efficiently adapted to large or small molds — ready to operate, just connect to source of electric power, cold water and drain.

MANUFACTURERS OF TEMPERATURE CONTROL EQUIPMENT SINCE 1918

Sterlco Model 6002
MOLD TEMPERATURE CONTROL UNIT
INDUSTRIAL CONTROL DIVISION
STERLING, INC.
3756 N. Holton Street • Milwaukee 12, Wis.

"dag" Concentrated Dispersions of Carbon Black

. . . for coloring polystyrene, polyethylene, ethyl cellulose, cellulose acetate and the vinyls.

Produced either in granular form or as readily extendible pastes, Acheson Concentrated Carbon Black Dispersions yield surfaces possessing high lustre and jetness without the use of toners ...using as little as one-fifth of the ordinary colorant.

They are literally dustless . . . will reduce processing time . . . minimize product contamination . . . shorten clean-up between runs.

These dispersions for the plastics and coating industries are described in a free booklet. For a copy call or write Acheson Colloids Corporation, Dispersed Pigments Division, 420 Lexington Avenue, New York 17, N. Y.

Acheson Colloids is equipped to do custom disintegrating, dispersing, and stabilizing of solids in a wide variety of vehicles. The dispersing of pigments and dyes to specification is one of our specialties.

Acheson Colloids Corporation

dag DISPERSIONS

Du Bois PLASTIC

Du BOIS
PLASTIC PRODUCTS, INC.
announces
The Completion of an
EXPANSION PROGRAM
with added production facilities
READY NOW

Number of presses open for immediate
COMPRESSION MOLDING
with finishing and assembly as demanded

INJECTION MOLDING
DEPARTMENT
Specializing in NYLON

COMPLETE TOOL AND DIE SHOP

Du Bois has the engineering ability, skilled operators and know-how, combined with added facilities to serve you from "idea to delivery".

Write, wire or phone your requirements.

Du BOIS
PLASTIC PRODUCTS, INC.
168-178 Florida St., Buffalo, N.Y.
Phone GA 8188

gained during the investigations. In most of the tests the changes in weight and dimensions were negative, any positive changes being in thickness. The flexural tests revealed several cases in which increases in flexural strength resulted from the accelerated weathering and service conditions. These increases in strength were attributed to further cure of the resins. Some of the data are shown in Tables VII and VIII and Fig. 9, 10, and 11.

Results of the laboratory aging tests did not in all cases correlate with the results of outdoor weathering. A laboratory evaluation procedure for material or groups of materials must therefore be selected on the basis of the materials, the properties to be determined, and the conditions which the materials will meet in service.

An accelerated service test consisting of alternate exposure for 24 hr. at 175° F. and 95 to 100% relative humidity, followed by 24 hr. at 175° F. and a relative humidity less than 5%, was the most severe of those used in this investigation. All the materials except the asbestos-fabric phenolic laminate increased in thickness in this test. This material was the only one that increased in flexural strength and flexural modulus of elasticity on exposure to the above accelerated service test.

The asbestos-fabric phenolic and glass-fabric unsaturated-polyester laminates were the most resistant of the materials tested. The paper-base phenolic laminates were not so stable in weight and thickness after outdoor weathering as the other materials tested. These results indicate that the most resistant laminates are those made with materials that are least affected by water.

Effect of Immersion in Fuels

Tests were made to determine the effects of cyclic and continuous immersion in three fuels on the weight, dimensions, and flexural properties of 19 representative laminated plastic materials described in Table IX. The cyclic immersion test involved alternate 24-hr. periods of fuel immersion and air-drying. The continuous immersion test involved immersion in the fuels for different periods of time between 7 and 360 days. Both types of test were carried out at only one temperature, 77° F.

The fuels used were heptane (an aliphatic hydrocarbon), toluene (an aromatic hydrocarbon), and SR-6, a representative aircraft test fuel (a blend of aliphatic and aromatic hydrocarbons). The heptane used was a commercial *n*-heptane and the toluene, a technical toluene, both supplied by Phillips Petroleum Co. The SR-6 used was a mixture of di-

Table XI—Changes in Flexural Properties After the Cyclic-Fuel-Immersion Test[a]

NBS material designation	*Initial flexural strength[b]*	*Change[c] in flexural strength in:*			*Initial flexural modulus of elasticity[b]*	*Change[c] in flexural modulus of elasticity in:*		
		Heptane	*Toluene*	*SR-6*		*Heptane*	*Toluene*	*SR-6*
	(10^3 lb./in.^{2})	(%)	(%)	(%)	(10^5 lb./in.^{2})	(%)	(%)	(%)
Lignin paper								
D	23.5 ±0.4	−7	−8	−3	1.92 ±0.05	−10	−5	−4
Phenolic; high-strength paper								
C	35.1 ±0.4	−4	−7	−9	2.57 ±0.03	−8	−5	−4
S	33.7 ±0.3	−2	−2	−1	2.47 ±0.01	−4	−5	−1
Phenolic; cotton fabric								
J (Grade L)	17.4 ±0.2	3	3	1	1.12 ±0.04	−13	−11	−12
I (Grade C)	22.9 ±0.3	−2	−2	−1	1.24 ±0.02	−8	−3	−6
W (Grade C)	20.7 ±0.2	8	3	−1	1.20 ±0.04	0	−10	−7
L (Grade C; low pressure)	20.7 ±0.1	5	2	2	1.02 ±0.03	−4	2	1
Phenolic; rayon fabric								
Z	46.1 ±0.5	−2	−3	−1	2.22 ±0.04	−9	−9	−7
Phenolic; asbestos fabric								
K	9.0 ±0.1	19	9	11	0.99 ±0.06	5	10	10
Melamine; cotton fabric								
M	25.4 ±0.6	−2	−3	0	1.62 ±0.02	−3	2	1
Unsaturated polyester; cotton fabric								
F	16.1 ±0.4	−4	−3	−4	0.71 ±0.02	−2	−1	2
H	13.1 ±0.1	−4	−3	−6	0.67 ±0.02	−14	−12	−12
N	12.1 ±0.2	−12	−19	−20	0.45 ±0.01	−8	−22	−16
Unsaturated polyester; glass fabric								
E	34.1 ±0.1	−13	−16	−14	1.81 ±0.04	−9	−17	1
X	41.2 ±0.3	2	5	5	1.68 ±0.01	4	6	9
Y	34.5 ±0.2	−6	−5	−4	1.44 ±0.02	2	1	0
AA	20.3 ±0.9	11	0	4	1.82 ±0.05	−6	−10	−8
AB	56.5 ±0.9	−3	3	1	2.86 ±0.02	0	−3	1

[a] Each cycle of the test consists of a 24-hr. immersion and a 24-hr. drying period. Flexural tests were made after 10 cycles of test and reconditioning at 77° F. and 50% relative humidity for 48 hours. [b] Average value for six specimens. The accompanying plus and minus value is the standard error. [c] Based on average value for four specimens.

PLASTIC SCRAP

WE BUY IT
SELL IT
PROCESS IT

Plastics Division:

H. MUEHLSTEIN & CO. INC.

60 EAST 42nd STREET, NEW YORK 17, N. Y.

BRANCH OFFICES: Akron • Chicago • Boston • Los Angeles • Memphis
WAREHOUSES: Jersey City • Akron • Boston • Los Angeles • Memphis

M&M plastic granulator

In today's market the use of every available piece of scrap has become increasingly important. The M & M Plastic Granulator designed for "on the job grinding" can turn the material from your scrap barrel into usable granules and extra profit. Investigate today!

mitts & merrill
1016 South Water • SAGINAW, MICHIGAN

Stamp Names or Trademarks
ON YOUR PLASTIC PRODUCTS
with the easy-to-use **Kingsley**

Up to 1,000 stampings per hour.

No skilled operators necessary.

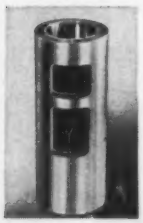
Uniform, clean-cut stampings in gold or colors.

Write us about your marking requirements. Enclose a sample or dimensions of part to be stamped. We'll reply air mail with complete details on how a Kingsley Machine can be applied to *your specific need.*

Kingsley STAMPING MACHINE CO.
1806 CAHUENGA BLVD., HOLLYWOOD 28, CALIF.

Extruders
find Xaloy-lined cylinders
hard to beat

INCREASE YOUR PRODUCTION!
DECREASE YOUR COSTS!



- **Xaloy** liners are highly resistant to abrasion and corrosion.
- **Xaloy** minimizes contamination.
- **Xaloy** reduces friction.
- **Xaloy** has uniformity of quality.
- **SPECIFY XALOY LINERS TO YOUR SUPPLIERS**

FOR CORROSION RESISTANCE — FOR ABRASION RESISTANCE

Xaloy

Xaloy 306

INDUSTRIAL RESEARCH LABORATORIES, LTD.
961 EAST SLAUSON AVENUE
LOS ANGELES 11, CALIFORNIA

WRITE FOR ENGINEERING AND PRODUCTION DATA BOOK!

REPRINTS
put them to work for you!

Reprints of articles and features that appear in this magazine cost so little that you really should consider using them. Many companies make it a regular practice to have stories which bear on their business reprinted for distribution to sales staffs, customers, prospects and stockholders.

If, at any time, there is or has been something in MODERN PLASTICS which you can use in reprint form, in quantities of 100 copies or more, write and quotations will be furnished promptly.

INDUSTRIAL MAGAZINE SERVICE
An Affiliate of Breskin Publications
575 Madison Avenue — New York 22, N. Y.

isobutylene (60%), toluene (20%), xylene (15%), and benzene (5%) and 0.2 lb. of aviation gasoline inhibitor per 1000 gal., supplied by Standard Oil Co. of New Jersey. The inhibitor consists of 50% of *n*-butyl-*p*-aminophenol, 30% of isopropyl alcohol, and 20% of anhydrous methanol, and is added in order to hinder the oxidation of the di-isobutylene, a diolefin, with consequent gum formation.

The data obtained in the cyclic immersion tests are shown in Tables X and XI. The relative resistance of the samples in both the cyclic and continuous immersion tests is shown in Table XII which lists those materials which exceeded arbitrarily selected values for changes in weight, dimensions, and flexural properties.

The following conclusions refer to the actual numerical results obtained in this investigation. Since there may be appreciable differences in the properties of individual sheets taken from the same batch, in different batches made by the same manufacturer and in similar laminates made by different manufacturers, any general inferences drawn from these data about a given type of laminate

(*Continued on p. 189*)

Table XII—Samples With Changes in Properties Greater than Selected Values Indicated in This Table After Immersion in Heptane, Toluene, and SR-6 Fuel Blend[a]

Property	*Heptane*	*Toluene*	*SR-6*
Weight (>±1% change)			
Cyclic immersion	...	N	N
Continuous immersion, 360 days			
Tested immediately	N,AA	E,F,H,K, N,Y,AA	E,N,AA
Reconditioned	...	E,F,N,Y	N
Length and width (>±0.1% change)			
Cyclic immersion	N	N	N
Continuous immersion, 360 days			
Tested immediately	N	F,H,K,N	N
Reconditioned	N	F,H,K,N	N
Thickness (>±0.5% change)			
Cyclic immersion	AA	N,AA	I,L,N
Continuous immersion, 360 days			
Tested immediately	F,N,X	E,F,N,Y,AA	M,N
Reconditioned	AB	E,F,N,Y,AA	M,N,AA
Flexural strength (>−10% change)			
Cyclic immersion	E,N,	E,N,	E,N,
Continuous immersion, 360 days			
Tested immediately	E,N,Y	E,F,N,Y,AA	E,N,Y
Reconditioned	E,N,	E,F,H,N,Y	E,N,Y
Flexural modulus of elasticity (>−5% change)			
Cyclic immersion	C,D,E,H,I, J,N,Z,AA	E,H,J,N, W,Z,AA	H,I,J,N, W,Z,AA
Continuous immersion, 360 days			
Tested immediately	...	E,F,H,N, AA,AB	E,N,AB
Reconditioned	...	E,F,H,N,AA	D,E,N

[a] The letters are the designations for the laminates tested as shown in table VIII. Due to the variability of the V material, it was not included in this summary.

Only a
Plant
can offer
a
COMPLETE
SERVICE
WE MANUFACTURE . . . Virgin Thermoplastic injection and extrusion molding compounds, standard and special formulations . . . Polystyrene, Polyethylene, Acetate, Butyrate, Ethyl Cellulose, Vinyls, Acrylics.
WE BUY . . . THERMOPLASTIC SCRAP—all types and forms: Polystyrene, Vinyls, Nylon, Ethyl Cellulose, Polyethylene, Acetate, Butyrate, Acrylics.
WE CUSTOM COMPOUND your materials, and offer these special services: Sorting, De-contaminating, Color-Matching, Pelletizing.
WE EXTRUDE . . . any flexible or rigid formulations which you plan for any special-shaped Belting, Binding, Edging, Rods, Tubes, Film, Strips . . . in Polystyrene, Cellulose Acetate, Polyethylene, Vinyl, Butyrate, Ethyl Cellulose, Acrylics.
DRYCOL—offered as Gering's perfected dry coloring medium for in-plant coloring of ALL PLASTICS. No special skill or equipment needed. Standard, Special and Metallic colors available or to order.
WRITE DEPT. MP

drop em in the hopper

they COME OUT PRINTED

by this **APEX AUTOMATIC**

Print one or two color decorations, trade marks, illustrations on almost any surface—plastic, glass, metal, wood, cardboard, etc. Automatic, continuous. No skill required to operate! 2500 pieces per hour. Special machines to order.

Send for illustrated bulletin and samples of work!

One-Color — Model C-31, $910
One or Two Colors — Model C-32, $960

APEX

APEX MACHINE MANUFACTURING CORP.
53 East 10th St. • New York 3, N.Y.
Largest and Oldest Mfrs. of Multi-Color Ink and Hot Stamping Machines

SEND FOR THIS!

NEW EDITION

• Have you checked your scale needs? Get latest information on the Toledos that help you guard costs . . . speed production. Send for catalog today. Toledo Scale Co., Toledo 1, Ohio.

Printed Weights—eliminate human errors—assure that weight-cost records are right from the start!

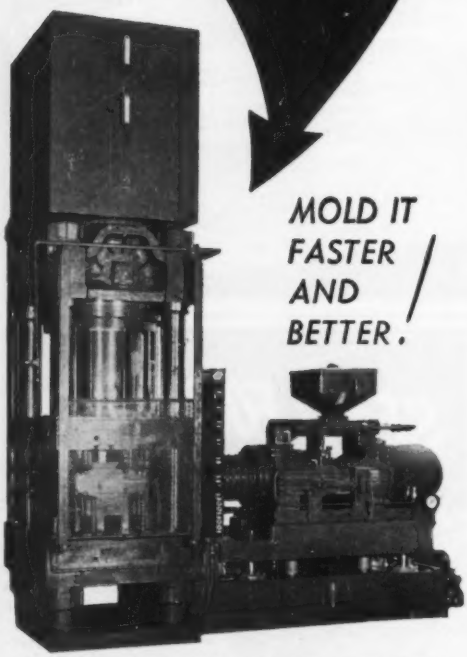
50th ANNIVERSARY 1901-1951

TOLEDO

HEADQUARTERS FOR SCALES

THE NEW IMPCO VF800

STANDARD — 48 ounce
PREPLASTICIZER — 150 ounce



MOLD IT FASTER AND BETTER.

For better molding! Higher production! Fewer rejects! Turn to the new Impco VF800 Injection Molding Machine . . . it's fast . . . it's efficient . . . it's versatile . . . featuring vertical 800 ton clamp — a 24 inch clamp-stroke (adjustable) — 48 ounce standard injector or 150 ounce preplasticizer injector.

Write for information.

PLASTIC MOLDING MACHINERY DIVISION

Improved

PAPER MACHINERY CORPORATION

NASHUA, NEW HAMPSHIRE

· SPECIALISTS · IN MATCHING COLORS FOR PLASTIC MOLDERS

Send us a sample of the color desired with at least five (5) pounds of the material you wish to color. We will return our match for your criticism. We use both dry color and wet dye process.

We also manufacture inks for printing on plastic.
Let us serve you.

HOMER W. PALMER AND COMPANY, INC.

515 North Halsted Street Chicago 22, Illinois

Seeley 3-2634

PROTECT YOUR PRODUCTS DURING SHIPMENT *with*

S·S·White PLASTIC DUMMY SHIPPING PLUGS AND CAPS

HEX. SOCKET TYPE PLUGS FOR N.P.T. PIPE THREADS

SHOULDER TYPE PLUGS FOR MACHINE SCREW THREADS

PLAIN TYPE PLUGS FOR N.P.T. PIPE THREADS

TYPE C CAP NUTS FOR MACHINE SCREW THREADS AND N.P.T. PIPE THREADS

Made of tough, non-brittle plastic. Available from stock molds in a wide range of sizes. Details in *BULLETIN P-4601.* Copy mailed on request.

CONTRACT MOLDING *in all standard thermoplastic and thermosetting materials.*

THE *S·S·White* DENTAL MFG. CO. PLASTICS DIVISION

Dept. M, 10 East 40th St. NEW YORK 16, N. Y.

WESTERN DISTRICT OFFICE: Times Bldg., Long Beach, Calif.

should be considered of a tentative nature.

No one sample exhibited smaller changes than all the other samples in all properties for all fuels and for both the cyclic and the continuous immersions.

In all three fuels the weight changes of the majority of the laminates were less than 1% in the cyclic test and did not exceed 1.5% after 360 days of continuous immersion. The largest weight changes were usually obtained with the unsaturated-polyester laminates in toluene.

With very few exceptions, mainly cotton-fabric unsaturated-polyester samples, the length and width changes after either the cyclic or the 360-day immersion in the fuels did not exceed 0.1%. In both types of test the changes in thickness were, in the majority of cases, less than 1%. The exceptions occurred mainly in the 360-day immersion test for several unsaturated-polyester laminates in toluene.

The best weight and dimensional stability in all three fuels in the cyclic test was observed with the glass-fabric unsaturated-polyester laminate X.

After the 360-day immersion test, the weight and dimensional changes were, in the majority of cases, higher for the samples when tested immediately as compared with measurements after reconditioning for 7 days.

The changes in flexural strength for the cyclic test and after the 360-day immersion test were, in the majority of cases, negative. However, the losses were less than 10% for all samples except some unsaturated-polyester laminates. For the latter samples in the 360-day test, greater losses usually occurred in toluene than in the other fuels.

The changes in flexural modulus of elasticity were, in the majority of cases, negative in the cyclic and the continuous immersion tests. In the cyclic test no losses greater than 10% were shown by the samples except by one phenolic laminate and several unsaturated-polyester samples. After 360 days' immersion no losses greater than 10% occurred except for some unsaturated-polyester laminate samples in toluene or in SR-6 or in both.

The unsaturated-polyester laminate samples varied widely among themselves in regard to the magnitude of the change in a given property after immersion tests.—END

SPEED ALLOY
hot rolled ALLOY STEEL PLATE

This STEEL is a "STEAL" when you consider the savings

IT sounds incredible that an alloy steel of Rockwell C 35 could be machined with a surface speed of 250 f.p.m. or more. Eagle Tool & Machine Co., Newark, N. J. readily cut SPEED ALLOY at that high rate of speed on their Cincinnati Hydrotel duplicating machine. Eagle feels that the easier machining qualities of this steel enable them to cut cavities for plastic molds at such low costs that results obtained are unequaled by other materials or methods.

On the cavity force, shown above, for molding a large home freezer breaker frame, SPEED ALLOY plates 5" x 32" x 62", were furnished heat treated to Rockwell C 35. Cavity was machined to 1" depth. Roughing cut was made with 5" milling cutter, cutting in full diameter to depth of ¼" with feed of 7" per minute; a maximum of 8¾" of steel removed per minute. By using pre-hardened steel there was no distortion due to subsequent heat treatment. Machined finish was like a mirror. Considering the initial low cost, machining costs and longer tool life, SPEED ALLOY is a "Steal"!

Speed Alloy Cams Carburized and Hardened With Practically No Distortion

This paper box machine cam is ⅞" thick, has track ⅛" deep and 1¼" wide, leaving web only ⅜" thick. This is ample because of SPEED ALLOY'S high tensile strength and wear resistance. Despite thin web section cams were carburized and hardened with distortion held to .002" to .003". Made by S & K Tool & Die Company, Kalamazoo, Mich.

Since 1856

W. J. HOLLIDAY & CO. (INC.)

SPEED STEEL PLATE DIV.
120 139th St., Hammond, Ind.
Plants: Hammond and Indianapolis, Indiana

DISTRIBUTED BY

Brown-Wales Co. — Boston - Hartford - Lewiston, Me.
Bridgeport Steel Co. — Bridgeport, Conn.
Beals, McCarthy & Rogers — Buffalo, N. Y.
Burger Iron Co. — Akron, Ohio
Grammer, Dempsey & Hudson, Inc. — Newark, N. J.
Earle M. Jorgensen Co. — Los Angeles-Houston-Oakland
Passaic County Steel Service, Inc. — Paterson, N. J.
Peacock's Ltd. — Halifax - Montreal - Toronto - Winnipeg - Vancouver
Peninsular Steel Co. — Detroit, Mich.
Pidgeon-Thomas Iron Co. — Memphis, Tenn.
Horace T. Potts Co. — Philadelphia - Baltimore

THE PLASTISCOPE*

NEWS AND INTERPRETATIONS OF THE NEWS

By R. L. Van Boskirk

Benzene from Petroleum

CERTIFICATES of necessity have so far been granted at 100% accelerated amortization to nine petroleum companies for either new or additional facilities to manufacture chemical benzene. The total amount of benzene to be produced by these companies will be somewhere near 90 million gal. per year. The total is indefinite because the volume figure on the Standard Oil Co. (Indiana) production was not available at press time.

Of this amount capacity for producing benzene from petroleum by the end of 1951 will have been increased from 30 to 40 million gal. in addition to the approximately 12 million gal. that is now in production. Note that this is the annual rate only—actually new benzene from petroleum this year, in addition to the current 12 million gal., may not be more than 10 million gallons. It is anticipated that the operating rate for producing benzene from petroleum will be about 63 million gal. by the middle of 1952 and 90 million by the end of 1952. The program is expected to expand until 120 million gal. of petroleum benzene are brought in annually.

It is expected that cost of petroleum benzene will be 50¢ a gallon or more, and it is reported that one company has signed a five-year contract to produce benzene at 55¢ a gallon.

There is still a great deal of talk about producing benzene from petroleum by other methods than the platforming or hydroforming systems now most commonly used by petroleum companies. One petroleum firm is reported to be experimenting with benzene made from propane. Others are flirting with the Catarol process now used in England. This process is reported to be more economical because it does not rob gasoline of its high octane content, but oil people assert that economics of petroleum production and refining are so much different in this country than in England that the Catarol process is not practical here.

Another method not so well known, called the Cederberg process, which obtains both benzene and formaldehyde from methane, is also under investigation.

Still another additional source of benzene recently reported is a shipment of 300,000 gal. from Pacific Refiners, Ltd., Hawaii, to Stauffer Chemical Co.'s Los Angeles plant for use in its Henderson, Nevada, plant where it will be converted into insecticides. The benzene was derived from an oil-coking process by Honolulu Gas Co., which piped it directly to Pacific Refiners, Ltd., operator of Hawaii's only oil refinery. It is assumed that regular deliveries will follow this initial shipment, but the volume expected is not known at present.

Benzene and Aromatic Avgas Blending Stock Facilities Recommended for 100% Accelerated Amortization

Company and location of facilities	*Capital cost*	*Capacity, barrels per day*[a] *Benzene*[b]	*Toluene*[b]	*Aromatic base*[c]
Aromatic Refining Co. Baton Rouge, La.	$ 3,564,000	640	——	1360
Pan American Refining Co. Texas City, Tex.	1,100,000	——	600	——
Atlas Processing Co. Shreveport, La.	1,900,000	420	——	——
Standard Oil Co. of Calif. El Segundo, Calif.	6,540,000	860	——	3080
Sun Oil Co Marcus Hook, Pa.	3,490,600	550	1000	1800
Standard Oil Co. (Indiana) Whiting, Ind.	11,000,000	[d]	390	1820
Old Dutch Refining Co. Muskegon, Mich.	515,130	150	370	——
Cosden Petroleum Corp. Big Spring, Tex.	1,325,000	100	230	420
Shell Oil Co. Houston, Tex.	4,604,000	1250	——	2500
Continental Oil Co. Lake Charles, La.	1,909,299	182	636	——
Total	35,948,029	4152 (63,615,000 gal./yr.)	3226 (49,455,000 gal./yr.)	10,980

[a] 42 gal. per barrel. [b] Chemical Grade. [c] Includes toluene and xylene concentrates. [d] Data unavailable at press time.

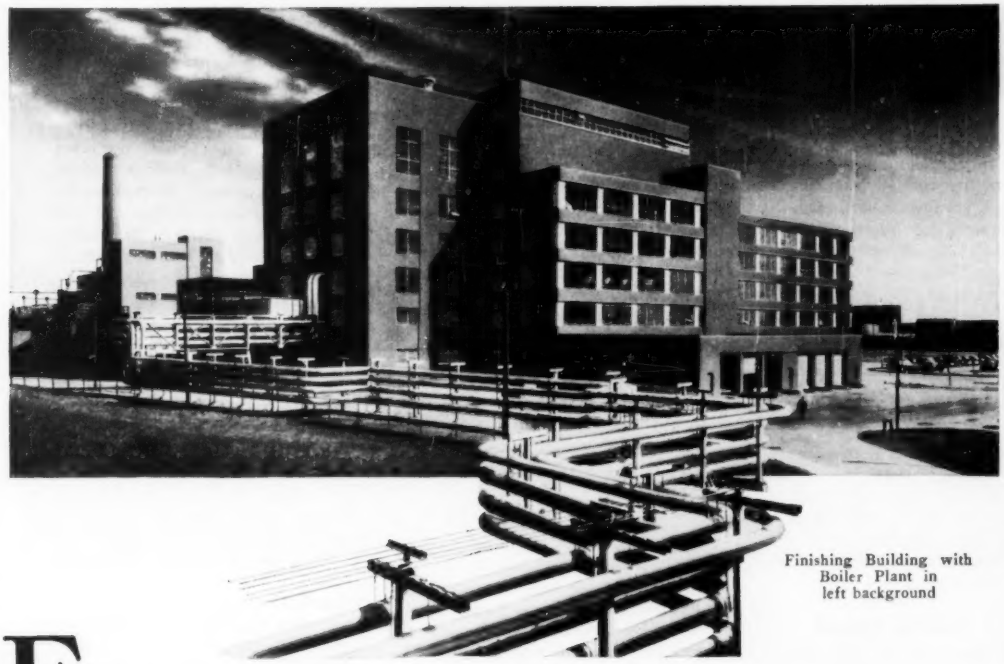
Laminate Coating

DEVELOPMENT of a coating material for polyester laminates has been announced by Bee Chemical Co. The new material, called Logoset, is reported to have good adhesion as well as resistance to ultraviolet radiation, humidity, salt spray, and embrittlement.

The producer points out there are no universal standards of performance for polyester coatings, because demands differ, depending on the polyester and its use. After heat curing, many polyester laminates become insoluble in organic solvents. Hence, an almost unlimited number of types of solvents—and, therefore, resins—can be used in formulating finishes for the polyester laminates. However, this same factor eliminates the ability to obtain adhesion by controlled solvent action as is possible in finishing thermoplastic materials.

Bee Chemical asserts that it has overcome this difficulty by provid-

* Reg. U. S. Pat. Office



Finishing Building with Boiler Plant in left background

FROM REPORTS . . . *to Producing Plant*

For Lever Brothers Limited, Stone & Webster Engineering Corporation prepared a series of reports covering alternative plans for consolidation and expansion of the company's manufacturing facilities in Toronto.

The resulting new plant facilities, selected to achieve more efficient and economical operation, were designed and constructed by Stone & Webster Engineering Corporation.

Left to right, Boiler Plant, Glycerine Refinery and Finishing Building which includes manufacturing equipment for soap products and toilet preparations.

STONE & WEBSTER ENGINEERING CORPORATION

A SUBSIDIARY of STONE & WEBSTER, INC.

PLASTISCOPE

ing a wide variety of Logoset coatings which are selected according to the type of polyester used and the end product to be coated.

Requests for information on the type of Logoset most suitable for a given application are to be addressed to Bee Chemical Co., 13799 S. Avenue "O", Chicago 33, Ill.

Sand Molds

ANOTHER material for making binders for sand cores has been announced in U. S. Patent 2,534,743. These binders are made by reacting glycerine with the reaction product of a tall oil vinyl ester and maleic anhydride. When used with foundry sand, the resulting sand core is heat-treated to cure the glycerine containing resinous binder.

Resin for Plywood

THE Hardwood Plywood Manufacturers Industry Advisory Committee has been advised by NPA that every effort will be made to encourage increased Government use of hardwood plywood. This can be achieved, NPA officials said, by making specifications for hardwood plywood or softwood plywood interchangeable wherever possible.

A government spokesman told the committee that during the 1952 fiscal year, which begins July 1, 1951, the government will purchase for military requirements 42 million sq. ft. of hardwood plywood, compared with purchases totalling 32 million sq. ft. in the 1951 fiscal year.

It was pointed out that use of plywood cases for shipping refrigerators or motors to the military would require more than 50 million additional sq. ft., making an overall usage in the 1952 fiscal year of more than 90 million sq. ft. of hardwood plywood. It is made principally from imported mahogany and from domestic maple and birch. Softwood plywood is made chiefly from Douglas fir.

A representative of the NPA's Chemical Div., however, pointed out that the supply of phenol used in plywood adhesives is extremely short at the moment, but that additional production facilities coming into use in September will help relieve the situation.

The supply of urea resin which has been used primarily in hardwood plywood for interior use is satisfactory, NPA reported, but that of melamine is still scarce with only partial relief expected this year. Industry representatives suggested that specifications be broadened to permit the use of a urea-melamine combination. Resorcinol is in shorter supply than any of the chemicals mentioned, and NPA suggested that hardwood plywood manufacturers change to phenol wherever possible.

Standards for Tableware

COMMERCIAL Standard 173-50 for heavy duty alpha-cellulose filled melamine tableware can now be obtained from the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D.C., for 5¢.

These standards are commodity specifications voluntarily established by mutual consent of those concerned. They present a common basis of understanding between the producer, distributor, and consumer, and should not be confused with any plan of governmental regulation or control. The U. S. Dept. of Commerce has no regulatory power in the enforcement of their provisions, but since they represent the will of the interested groups as a whole, their provisions through usage soon become established as trade customs, and are made effective through incorporation into sales contracts by means of labels, invoices, and the like.

The standards for melamine dishware have been accepted by producers and a long list of users who are named in the booklet.

Among the requirements for melamine tableware before it can receive the hallmark label which constitutes the manufacturer's declaration of compliance with this commercial standard are: it must have a thickness of not less than 0.100 in. over not less than 90% of the surface area, and the remainder must not be less than 0.090 in. in thickness; the surface must have a high luster produced by molding, and not by the application of finish or protective coating of lacquer; flash or parting lines only shall be buffed to a high polish; when boiled in an aqueous solution of sulfuric acid, melamine tableware shall show no chalking and/or loss of gloss that is readily perceptible; it must also resist boiling water so that there will be no cracks or surface chalking; the tableware must also withstand 8 hr. baking at 170° F. without cracking.

New Association Formed

As we go to press announcement is made of the recent formation of the Proprietary Plastic Manufacturers Association. The first general meeting was scheduled for Wednesday evening, July 11th, at the Hotel Chelsea, Atlantic City, in connection with the National Houseware and Home Appliance Show.

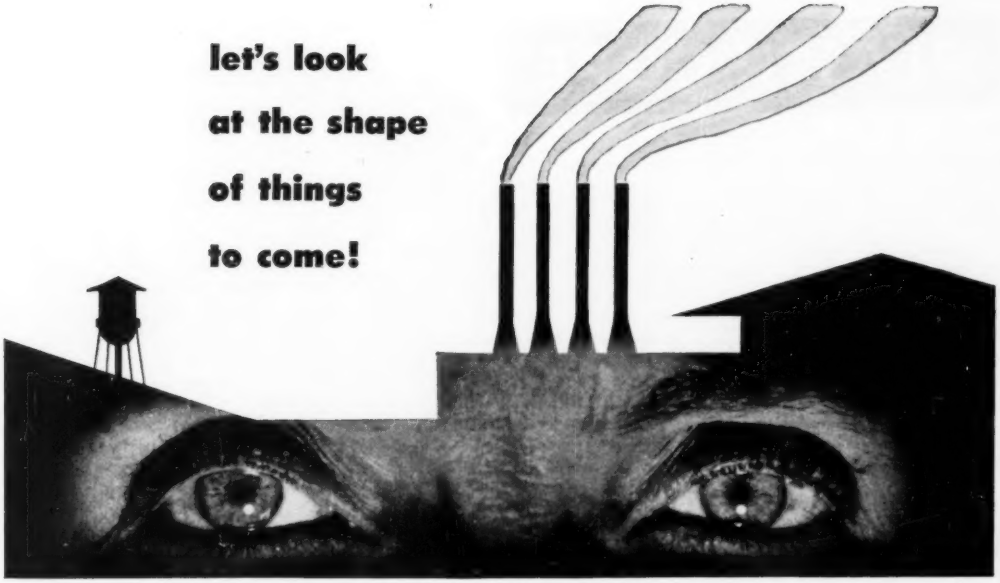
Aim of the new organization is the development and up-grading of the merchandising activity of the plastics industry as a whole.

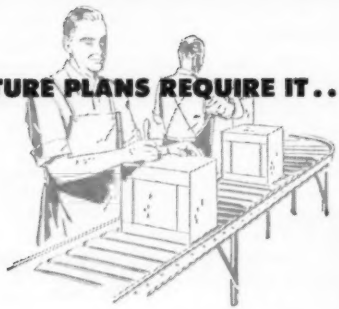
At an organizational meeting held in Chicago, June 27th, the following officers of the new Association were elected: V. B. Mockenhaupt, Victory Mfg. Co., Chicago, president; Ray Hardt, Plastic Metal Mfg. Co., Chicago, vice president; David Lovitz, Bernard Edward Co., Chicago, treasurer; Richard Winters, Federal Tool Corp., Chicago, secretary.

Saran Yarn

IT HAS been known in the trade for several years that The Saran Yarns Co., Odenton, Md., a jointly owned subsidiary of The Dow Chemical Co. and National Products Co., has been working on the development of a fine-denier saran curled staple fiber. The company has now reached the stage where it seems satisfied with its product and has announced favorable results of extensive evaluation tests that indicate there will be numerous applications in civilian and military areas.

It is particularly applicable in the carpet industry where a saran-wool combination yarn has been developed which imparts a pleasing iridescence, longer life, and pronounced ease of cleaning to the finished carpet. It is also reported that





... IF FUTURE PLANS REQUIRE IT... here's how your customers can cut costs with fewer assembly operations

They can look to plastics . . . and particularly polystyrene . . . for a speedier production cycle.

Through advances in polystyrene research, in molding techniques and machinery, they now can make *larger area moldings* . . . many with complicated and intricate designs *in one operation.* These new moldings may help them to cut many assembly steps with the result . . . more units per day at lower cost.

Also . . . polystyrene has built-in color . . . color that won't chip, peel or rust. This feature eliminates many finishing operations.

Dow, as a leader in the plastics industry, offers you and your customers a complete line of *quality controlled* Styron (Dow polystyrene) plastics, plus the expert assistance of Dow's Plastics Technical Service. When looking at the shape of things to come in '51, be sure to include Styron in your planning for future civilian or defense products. Write Dow today.

Plastics Division—Dept. PL-110

THE DOW CHEMICAL COMPANY
MIDLAND, MICHIGAN

New York • Boston • Philadelphia • Washington
Atlanta • Cleveland • Detroit • Chicago • St. Louis
Houston • Los Angeles • San Francisco • Seattle
Dow Chemical of Canada, Limited, Toronto, Canada

STYRON

a quality plastic for a quality job!

DOW plastics

PLASTISCOPE

100% saran carpets have been produced and are now being evaluated.

One of the advantages of the material is that color is an integral part of each fiber. The finished product thus has increased color stability. Saran curled staple fiber is unique in the field of man-made fibers in that the curl is inherent and comparable to natural wool. This feature adds bulk and coverage to the resulting fabrics. Present production is limited, but estimates indicate substantially increased volume during the early months of 1952.

Summer Shutdowns

AMONG the first companies to announce a temporary shutdown during the summer months is Rohm & Haas Co. which states that its Knoxville plant will be closed from June 29 to July 15 and the Bristol, Pa., plant from August 4 through 19th.

Readers should note that many other plastics companies are planning to follow a similar course despite the high demand for plastic materials this summer. The shutdowns are primarily for the purpose of granting as many vacations as possible at one time and repairing equipment.

Paste Stabilizer

COMPLETELY homogeneous paste, composed of 100% active components contributing to the heat and light stabilization of polyvinyl chloride resins and their copolymers, has been released to the market by Stabelan Chemical Co. through the distributing centers of Harwick Standard Chemical Co., Akron, Ohio.

Known as Stabelan G-1, the new paste has been thoroughly tested in laboratory and plant runs with various resins, plasticizers, and lubricants with results reported as notably satisfactory. It is also being recommended as a stabilizer for organosol and plastisol dispersions, for cast films, extruded or injection molded products, and for monofilaments made of vinyl or vinylidene chloride.

The company claims the new paste has excellent heat stability, preventing discoloration of vinyl resins during fluxing or fusion at very high temperatures. Industrial runs have shown that the processing of these resins at temperatures up to 350° F. is feasible in the production of clear or pigmented films on the calender or cast from dispersions.

Plant Expansion

PLASTICS mold-making facilities of the General Electric Co. plant at Pittsfield, Mass., have been expanded and modernized in a move to integrate operations servicing the Decatur, Ill., and Taunton, Mass., molding plants of the plastics division. The modernized tool room, covering 40,800 sq. ft., has twice the area of the former operation.

Baton Rouge Plant Expanded

ANNOUNCEMENT of a major expansion program which will double production of its recently purchased Paracril nitrile rubber plant has been made by United States Rubber Co. The Naugatuck Chemical Div. of U. S. Rubber says that the expansion program will bring plant capacity for the production of Paracril nitrile, Nitrex latex, high styrene latex, and high styrene resins to approximately 30 million lb. annually. The expansion will be completed by early 1952. Company officials point out that they expect increasing uses for their high styrene latex in water-base paints and paper coating applications; for high styrene resins in combination with Paracril in injection and extrusion operations; and for Nitrex—which is Paracril in latex form—in paper, textile, and leather finishing applications.

Instruments

PRODUCERS of recorder-controller instruments have requested that they be given interim and priority assistance to obtain critical materials until the Controlled Materials Plan becomes fully effective. Recorder-controller instruments are used to control quantity, quality, and temperature in processing heavy chemicals, metals, plastics, synthetic fibers, and so forth. The shortage of these instruments is reported to have already delayed the beginning of production in several plants now being made ready for manufacture of chemicals used in the plastics industry. The industry advisory committee for these instruments has asked that they be allowed to use 150% of the basic materials consumed in the first quarter of 1951.

Plastics Tubing and Pipe

THE diversity and special application of plastics tubing, one of this industry's most promising future fields, is exemplified by a recent statement by Flexible Tubing Corp., Guilford, Conn., which calls attention to the growing importance of a market that has been scarcely skimmed by the plastics industry. For five years the company has been merchandising Spiratube, a lightweight flexible plastic tubing for handling air in all industries. Two later varieties are Flexflyte, specifically made for aircraft, and Ayrtube for the mining industry. The large volume of the amount of tubing used in mines has just become apparent in the recent polyethylene allocation ; when large quantities were claimed for this purpose as an essential civilian application. Flexible Tubing asserts that it has a wide variety of tubings and ducts to offer industry that can be tailor made to fit the needs of particular industries.

The South's Potentials

POTENTIAL plastics markets in the South are virtually unlimited, and basic ingredients for 90% of the entire plastics industry are available in that region, yet the South has less than 10% of all plastics manufacturing plants, according to a survey by Dr. Raymond B. Seymour, executive vice president of The Atlas Mineral Products Co., Mertztown, Pa., and formerly director of the University of Chattanooga's Industrial Research Institute.

He points out that present consumption of plastics in the South far exceeds the output of Southern plants, and the region's markets are wide open. He further says that, although the South has been deficient in the matter of technical and scientific manpower, the region is building up a background of technical knowledge in the plastics field that will be useful to both manufac-

GRC CUTS COST AND TIME!

TINY INJECTION MOLDED PRECISION PLASTIC PARTS

Completely automatic . . . parts delivered trimmed, ready for use, in one operation, with GRC's speedy, specialized production facilities. NYLON A SPECIALTY

INDIVIDUAL PARTS
No limit on smallness. Intricacy and precision—our unique features

INDIVIDUAL INSERTS
Automatic insert feed permits wide variety of product possibilities.

CONTINUOUS INSERTS
Small members accurately spaced on tape, cord, wire, chain, etc.

Maximum Size: .025 oz.—1¼" long
NO MINIMUM!

LOW MOLD COSTS
Write Today for Samples and Prices

GRIES REPRODUCER CORP.
E. 133rd St. & Willow Ave., New York 54 • MO 9-2476

Shawnee
REG. U.S. PAT. OFF.

DRY COLORS

COLORS FOR PLASTICS

•

Strontium Chromate Yellow

•

Ming (Molybdate) Orange

•

Organic Red, Maroons
Blue & Green Toners

•

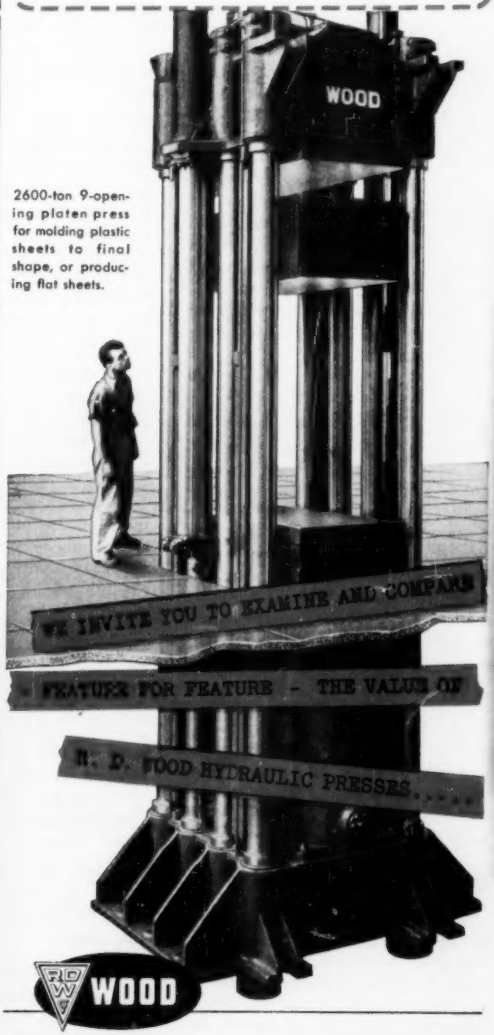
Red & Yellow
Cadmium Toners
(Subject to limitations of NPA Order M-19)

•

Offerings based on extensive experience with leading plastics manufacturers

KENTUCKY COLOR & CHEMICAL CO.
Incorporated
General Office and Works: Louisville, Ky.
Branches and Representatives in Principal Cities

If it's an R. D. WOOD *... It's Good**



2600-ton 9-opening platen press for molding plastic sheets to final shape, or producing flat sheets.

R. D. WOOD COMPANY
PUBLIC LEDGER BUILDING, PHILA. 5, PA.
Established 1803

HYDRAULIC PRESSES AND VALVES FOR EVERY PURPOSE
ACCUMULATORS • ALLEVIATORS • INTENSIFIERS

* FIND OUT WHY. SEND FOR YOUR FREE COPY OF OUR NEW PHOTOGRAPHIC BOOK OF PLANT FACILITIES.

PLASTISCOPE

turers and consumers. Out of 22 institutions of higher learning now offering courses in plastics, four are in the South. They are the University of Louisville, University of Texas, Virginia Polytechnic Institute, and University of West Virginia. The region also supports 11 plastics research laboratories.

Dr. Seymour says that "in spite of its being a multi-million dollar industry, plastics manufacture is still in its adolescence and will treble in the next decade. With continuous emphasis on education and research in the South, this region will reap its share of the fruits of this growing plastics tree."

Acrylic Sheet

A RECOMMENDATION that its customers use Plexiglas II-U.V.A. for all purposes has been made by Rohm & Haas Co. The company points out that it has been recommending Plexiglas II for outdoor use for some time, but now suggests that it be used for all applications because it has better weathering characteristics and less tendency to craze on long-time exposure to the elements than Plexiglas I-A.

The company has announced a plan to convert all of its production to the heat-resistant grade by the end of 1951. For the immediate future this program will apply primarily to colorless Plexiglas until matches for standard colors in the heat-resistant grade are developed.

COMPANY NOTES

The Barrett Div., Allied Chemical & Dye Corp., has applied for a necessity certificate covering additional facilities for the production of synthetic phenol at its Philadelphia chemical plant. The projected expansion, which would treble Barrett's phenol productive capacity, would include power, storage and warehousing facilities. The total expenditure would exceed $8 million.

Barrett's new plant would utilize a new, highly efficient process for synthesis of phenol, embodying the results of long range research work conducted by Allied Chemical's Central Research Laboratory at Morristown, N.J. The new process does not involve the use in any form of sulfuric acid or chlorine, scarce materials now used in commercial synthetic phenol processes.

Elmes Engineering Div., American Steel Foundries which recently moved to 1150 Tennessee Ave., Cincinnati, Ohio, is this year celebrating its 100th anniversary. For many years, Elmes has been known as one of America's leading manufacturers of hydraulic presses and was a pioneer in the development of compression presses for the thermosetting industry.

Kay-Fries Chemicals, Inc., started rebuilding the section of its West Haverstraw, N.Y., plant two days after it was damaged by fire recently. Production of formaldehyde resumed almost immediately, and within a short time the remaining units of the plant should be producing the complete line of fine organic intermediates as well as diethyl and dimethyl phthalate.

Plastics & Resins Div., American Cyanamid Co., announces a price reduction of 20¢ per lb. for its mineral-filled molding compound, Melmac P-592 and P-592-A which is used primarily for electric insulating applications. These compounds are shipped in 250-lb. containers, and the price per pound is now 75¢ for less than a drum and 65¢ for one drum or more.

Brown Co., Berlin, N. H., has moved its sales offices from New York City to 150 Causeway St., Boston, Mass.

Precision Tool & Die Co., Bronson, Mich., manufacturer of plastic molds, tools, dies, and fixtures, has been sold to **Oliver Goshia**, who has become vice president and treasurer of the firm. **Otto A. Rissman** continues as president in charge of production, and no change in policy is being made.

Plax Corp. has moved the headquarters of its sales and accounting offices to 672 Farmington Ave., Hartford, Conn. The firm also announces the appointment of **Denton Anderson** as assistant vice president.

Victory Plastics & Embossing Corp. is operating a new plant at Harvey, Ill., for embossing and laminating Vinylite film and sheeting supervised by **Donald A. Stolzenbach.**

The Plas-Tex Corp., 2525 Military Ave., Los Angeles, Calif., has announced the appointment of **Joseph M. Jayne** as vice president in charge of operations and of **Howard D. Wolff** as sales manager.

American Petrochemical Corp. has been formed jointly by **The Firestone Tire & Rubber Co.** and **Cities Service Co.** for the manufacture of essential chemicals from petroleum hydrocarbons. A site at Lake Charles, La., is under consideration for the new plant.

Borden Co.'s Chemical Div. has announced the appointments of **Herbert H. Clarke, Jr.**, and **Charles W. Niederauer** as vice presidents. Mr. Clarke, who joined the company in 1940, was manager of the division's West Coast activities; Mr. Niederauer joined the firm in 1943.

The Hydraulic Press Mfg. Co. has announced the appointment of **John M. Dolan**, vice president and general sales manager, to the company's board of directors, and of **William S. Renier** as director of engineering.

Plaskon Div., Libbey-Owens-Ford Glass Co., has announced that **Donald O. Wynocker** has been named to assist **Charles Walker** in a newly expanded sales area covering Eastern and New England states for the company's glues and industrial resins.

Westville Laboratories, Monroe Center, Conn., is now manufacturing Porophor N, a foaming agent for plastics.

Glass Fibers, Inc., has announced that its offices have been moved to 1810 Madison Ave., Toledo 2, Ohio.

Michigan Plastic Products, Inc., has moved into its new plant on Robbins Rd., Grand Haven, Mich.

United States Polymeric Chemicals Corp., Ludlow St., Stamford, Conn., is now custom impregnating and coating glass cloth, glass mat, and paper for the high pressure laminating and reinforced plastics fields. **W. S. Thornhill** is president of the newly formed company, and **Martin**

POLY-SUPRA Molding Powder Colors...

IT'S NOT JUST TALK— MY COLORS ARE "LAB-TESTED"

"LAB-TESTED BY POLY-SUPRA" MEANS:

1. Tested in an experimental color laboratory and molding units duplicating your plant conditions.
2. A staff of competent chemists at your disposition to solve your color problems.
3. Rigid tests for heat stability, light fastness, dispersion, abrasion, toxicity, brilliance, shade and color match *before delivery.*

17 standard colors, also over 1500 colors in metallics, fluorescent, phosphorescent, mottled and pearl effects, transparent, opaque and translucent. Color matching a specialty. Pre-packed ready-to-use for 50 or 100 lbs. of Crystal, or in bulk, as desired.

Poly-Supra...Your Guarantee of Quality

Recommended by Monsanto and also used in Dow, Bakelite and Koppers Crystals by over 400 molders worldwide.

Product Protection: Products Liability Insurance.

Color Conformity: U. S. Bureau of Standards.

NEW LOWER PRICES— Communicate with us NOW!

- Eastern Representative: Arthur L. GeWertz, 521 Fifth Ave., N.Y. 17
- Pacific No.Western Representative: Leonard G. Heller, Suite 978, Mills Bldg., San Francisco 4, Calif.

POLY-SUPRA THE MOLDER'S PET

POLY-SUPRA KRIEGER COLOR & CHEMICAL CO., INC.
ORIGINATORS OF DRY COLOR FOR MOLDING
6531 Santa Monica Blvd. • Hollywood 38, Calif.

"Waste Not-Want Not"
Trim to exact size

Jacques
SLITTER and REWINDER

Handling a wider variety of materials faster and at less cost, the Jacques Slitter and Rewinder requires less capital investment. Has choice of contact or razor-type, or a combination of both cutters. New potented frictions. Up to 45" width and 40" rolls

Write today for free folder and fact sheet on plastic slitting.

HOBBS MANUFACTURING CO.
25 Salisbury St., Worcester 5, Mass.
EST. 1882

Manufacturers of:
JACQUES hand and power shears, **TRI-POWER** and **AUTOTRONIC** die presses, paper box machinery

---

For the kind of craftmanship that New England is famous for

Depend on SCOTT
Custom Molding

Even though SCOTT is BUSY on Prime Contracts for the Government, our Custom Molding, Engineering, and Moldmaking facilities are Available to you.

The
GEO. S. SCOTT
MFG. CO.
Custom Molders of Plastics Products
WALLINGFORD • CONNECTICUT

PLASTISCOPE

Oudegeest is vice president; both were formerly with Shell Chemicals.

Lustra-Cite Industries, Inc., manufacturer of the Lico line of display fixtures, has acquired one entire floor at 249 W. 34th St., New York, N. Y., for showrooms and offices.

Shelton Mfg. Co., Inc., has moved to 591 Ferry St., Newark 5, N. J.

American Insulator Corp., New Freedom, Pa., announces the election of two additional vice presidents—**John H. Bell,** vice president and comptroller, and **John K. Baronett,** vice president for production. The latter was formerly associated with Foote Bros. Gear & Machine Corp.

Steiner Plastics Mfg. Co., Inc., has announced increased facilities and the relocation of its plant and offices at Pratt Oval, Glen Cove, Long Island, N. Y.

The Dynakon Corp., 5509 Hough Ave., Cleveland, Ohio, which was formed to manufacture glass-fiber reinforced plastics, has taken over the operations of **Plastics Products Div., The Central Electrotype Co.,** also of Cleveland.

Fibron Plastics Dept., Irvington Varnish & Insulator Co., announces that **Dr. Richard M. Goldrick** has been named research manager, and **W. Moody Wilson** has joined the department as a research chemist.

Troy Engine & Machine Co., Troy, Pa., has announced the appointment of **Wetherbee Chemical Co.,** 1510 S. Park Ave., Buffalo, N. Y., as sales representative for its **Process Machinery Div.** in western New York.

Process Plants Engineering Co., designer and constructor of chemical and process plants, has opened new offices at 1060 Broad St., Newark, N. J.

Extruders, Inc., Culver City, Calif., announces the appointment of **Robert C. Raab** as manager of its **Aircraft Products Division.** He was formerly with General Cable Corp.

Argus Chemical Laboratory has removed its plant, offices, and laboratory to a new site at 633 Court St., Brooklyn 31, N. Y., which will enable the firm to triple its production of Mark stabilizers and Vinylum aluminum powder dispersions, and to develop new products.

Carbide and Carbon Chemicals Co. has announced the appointment of **Dr. George H. Law** as director of research, and **Dr. Franklin Johnston** as assistant director of research. **Julian Paul** has been named assistant product manager in the **Fine Chemicals Department.**

Goodren Products Corp., 136 W. 21 St., New York, N. Y., has been formed for the production of military orders exclusively—barrier bags for joint Army-Navy specifications; laminated acetate foil materials; printed cellophanes, glassines, and greaseproof papers, and metallized cellulose acetate. The announcement was made by **Reynold Goodman,** president of **Crystal Transparent Corp.** at the same address.

Sterilon Corp. is the new name of **Pla-Safe Plastics Corp.,** manufacturer of nylon filters for blood transfusion sets and other nylon products for civilian use. **Robert P. Evans,** president of the company, has announced there are no changes being made in the organization. Sterilon has government contracts for the production of nylon binocular case handles and nylon chin straps for M-1 helmets, replacing leather because of nylon's resistance to salt air, water, humidity, and fungus.

Synthane Corp., Oaks, Pa., manufacturer and fabricator of laminated plastics, has appointed **Warren C. Stokes** to its Milwaukee office.

Modglin Co., Inc., Los Angeles plastics and metal products manufacturer, reports total net sales for the fiscal year ending Mar. 31, 1951, of $2,236,666 compared to $2,152,257 for the previous fiscal period. The firm is now in the midst of an expansion program developing the new **Metal Products Division.** The first firm order for aircraft subcontracted parts has been received and is in production.

The Wheelco Instruments Co. has announced the opening of a new district agency for West Virginia at P. O. Box 1107, Charleston. The new office, under the direction of **F. E. Anderson,** has sales facilities for the company's recorders, controllers, and combustion safeguards.

PERSONAL

William F. Cullom, 251 E. 35 St., New York, N. Y., announces that he is representative for the following plastics firms in the territory that stretches roughly from New England to Washington, D.C., along the Atlantic Coast: **Carlon Products Corp.,** specialist in extrusion of large hollow thermoplastics with a maximum diameter achieved to date of 20 in. with a 0.375-in. wall; **Crescent Plastics Co.,** an extruder of conventional shapes specializing particularly in items that require close tolerances; **F & F Mold & Die Works, Inc.,** injection molder which specializes in created premiums; and **Robert Carroll Packaging Co.** which manufactures polyethylene bags.

Carl E. Holmes, formerly of General American Transportation Corp., Chicago, Ill., is now affiliated with **Camfield Mfg. Co.,** Grand Haven, Mich., as manager of the **Plastics Division.** The firm specializes in low pressure moldings and honeycomb structures.

Col. John J. Williams has been appointed vice president in charge of sales of **Duranol Products, Inc.,** Brooklyn, N. Y., manufacturer of plastic specialties and advertising displays.

Dr. Paul O. Powers, formerly with Battelle Memorial Institute, has been named chemical director of **Pennsylvania Industrial Chemical Corp.,** Clairton, Pa.

Lloyd L. Schrader has been appointed manager of the **Industrial Relations Dept., Heyden Chemical Corp.**

William T. Dickens has been named manager of the new **Monsanto Chemical Co.** plastics plant at Cincinnati, Ohio.

James W. Cleary has been named assistant plant manager at the **Hercules Powder Co.** plant in Parlin, N. J. He joined the firm in 1936.

Dale F. Behney, formerly with The Goodyear Tire & Rubber Co., has

Ortho-nitrobiphenyl, low-priced plasticizer that's efficient . . . and available

If costs and availability of plasticizers are headaches in your business, we suggest you investigate Monsanto's ortho-nitrobiphenyl today. ONB is efficient as a primary plasticizer or as an extender and it is immediately available in any quantities you need. It sells for only 14½ cents a pound in truckloads or carlots.

Ortho-nitrobiphenyl (also known as ortho-nitrodiphenyl) is compatible with cellulose esters and ethers, polyvinyl chloride, polyvinyl butyral, polyvinyl acetate, styrene, rosin and rosin esters, modified phenolic resins, oil-soluble alkyd resins and vegetable oils. This wide compatibility, plus its low hydrolysis rate and low price, makes ONB an unusually attractive plasticizer.

Most resins, both natural and synthetic, can be plasticized with ONB. The amount of required plasticizer varies with the resins and the use of the finished product. The volatility of ortho-nitrobiphenyl is less than diethyl phthalate and greater than dibutyl phthalate.

Ortho-nitrobiphenyl is readily soluble in carbon tetrachloride, mineral spirits, pine oil, turpentine, benzene, acetone, glacial acetic acid and perchlorethylene. It is a good solvent.

For technical information on ortho-nitrobiphenyl, contact the nearest Monsanto Sales Office or write for a copy of Monsanto Technical Bulletin No. OD-102. MONSANTO CHEMICAL CO., Organic Chemicals Division, 1700 South Second Street, St. Louis 4, Missouri.

DISTRICT SALES OFFICES: Birmingham, Boston, Charlotte, Chicago, Cincinnati, Cleveland, Detroit, Houston, Los Angeles, New York, Philadelphia, Portland, Ore., San Francisco, Seattle. In Canada, Monsanto (Canada) Ltd., Montreal.

MONSANTO
CHEMICALS — PLASTICS

SERVING INDUSTRY . . . WHICH SERVES MANKIND

PLASTISCOPE

been appointed manager of sales for **Harwick Standard Chemical Co.**, Akron, Ohio.

Rudolph W. Kugler, formerly with Heil Process Equipment Corp., has been assigned as a plastics coatings salesman in the New York area for **The Dow Chemical Co.**

I. F. Thomas has been appointed manager of the newly established western district office of **Industrial Div., S. S. White Dental Mfg. Co.** Mr. Thomas, whose headquarters are in the Times Bldg., Long Beach, Calif., will handle plastics products and aircraft accessories.

David Kline has been named a West Coast field representative for the **Plastics Dept., Rohm & Haas Co.**

Elmer H. Thompson has been appointed assistant sales manager of the **Prolon Plastics Div., Pro-phy-lac-tic Brush Co.**, Florence, Mass.

Glen E. Wilson has been appointed to the newly formed post of director of employe relations for **B. F. Goodrich Chemical Co.** Mr. Wilson has been with the parent company, **The B. F. Goodrich Co.**, since 1928.

William M. Hoyt, Jr., has been transferred to the **Engineering Laboratory** of **International Business Machines Corp.** as assistant to the manager. **Frank Reynolds** succeeds him as manager of the **Plastics Laboratory** for the firm.

Vernon W. Colby has been promoted to an assistant chemical sales manager for **Emery Industries, Inc.**

Dr. Eugene McCauliff has been elected vice president in charge of sales of **Glyco Products Co., Inc.**, Brooklyn, N. Y. He has been in charge of technical service and development since 1944.

Robert D. Buzzee, Chemical Dept., General Electric Co. has been appointed buyer for the **Plastics Div. O. O. Barton** has been named priorities supervisor for the same department where he is responsible for matters dealing with government priority regulations.

Howard Berry, formerly vice president and director of Mathieson Chemical Corp., has joined **R. S. Aries & Associates,** 400 Madison Ave., New York, N. Y., as senior associate.

Harding Miller has joined **George Woloch Co.,** 61 Broadway, New York, N. Y., where he will handle scrap rubber and plastics materials.

Herman B. Lermer, president, and **Irving S. Lermer,** executive vice president, will sever their relationship with the **Celluplastic Corp.**, Newark, N. J., in the latter part of 1951. They will retain their interest in the plastics industry, but their future plans at present are indefinite.

Dr. Rupert B. Lowe, vice president of **Bakelite Co.,** has received an Honorary Degree of Doctor of Science from Austin College, Sherman, Texas.

Dr. V. N. Morris, technical director of **Industrial Tape Corp.,** has been elected chairman-elect of the **North Jersey Section** of the **American Chemical Society** for one year, after which he will become chairman.

John P. Remensnyder, president and director of **Heyden Chemical Corp.,** has been chosen to serve as chairman of the Chemical Solicitation Committtee for the New York Cerebral Palsy Society's city-wide campaign.

Henry Avery has been made manager of the **Plasticizer Div., Pittsburgh Coke & Chemical Co.** He served with the U.S. Army Ordnance Corps during the war and, more recently, was plasticizer sales and product development engineer for Godfrey L. Cabot, Inc., of Boston, Mass.

M. F. X. Gigliotti has been appointed project construction manager of **Monsanto Chemical Co.'s** plastics plant at Cincinnati, Ohio. **George Drebo** has been named assistant construction engineer for the plant.

Martin Aaron has been elected a vice president of **American Plastics Corp.,** Bainbridge, N.Y. Mr. Aaron, who was formerly sales manager and assistant to the president, will continue to be in charge of sales and will be located in the company's branch office at 225 W. 34th St., New York, N.Y.

Deceased

Dr. Joseph S. Michtom, president of **Ideal Plastics Corp.,** died June 21 at the age of 61. Dr. Michtom was graduated from Columbia University in 1908 and from New York University Dental School in 1915. He practiced dentistry for 22 years before joining Ideal Novelty & Toy Co. (now **Ideal Toy Corp.**), which had been founded by his father, the late Morris Michtom. At the time of his death, Dr. Michtom was secretary of the corporation as well as president of its subsidiary, Ideal Plastics Corp. He was also president of Beth-El Hospital, Brooklyn.

Michtom

Joseph J. Bauman, president of **Kurz-Kasch, Inc.,** died June 18 at the age of 57. He joined the sales department of Kurz-Kasch in 1923 and later established the company's Chicago agency. He was made president of the company in 1937 and retained that office until his death. He was a Plastics Pioneer and a member of the S.P.I.

Bauman

MEETINGS

Sept. 3-13—World Chemical Conclave: the 75th anniversary of the American Chemical Society; 16th Conference of the International Union of Pure and Applied Chemistry; and the 12th International Congress of Pure and Applied Chemistry, Statler Hotel, New York.

Sept. 6-19—American Institute of Chemical Engineers, National Meeting, Sheraton Hotel, Rochester, N.Y.

Jan. 16-18—Society of Plastics Engineers, Inc., 8th Annual National Technical Conference, Edgewater Beach Hotel, Chicago, Ill.

HOW TO EXTEND YOUR PLASTICIZERS!

Use S/V SOVALOID C and Cut Plasticizer Bills 30 to 90%!

If you are using conventional plasticizers for Vinyl resins and Buna N, you can actually cut your costs 30 to 90% by extending these expensive plasticizers with *S/V Sovaloid C!*

S/V Sovaloid C costs but a fraction of ordinary, ester-type plasticizers—yet has many processing advantages. It is completely compatible with all Vinyl and Buna N compounds. It provides effective oil-resistant qualities . . . imparts flexibility . . . increases tensile strength . . . won't migrate from the finished product.

* * *

As an extender—or as a primary plasticizer—you can't beat *S/V Sovaloid C* for efficiency and economy! Ask your Socony-Vacuum Representative for full details.

SOCONY-VACUUM OIL COMPANY, INC., 26 Broadway, New York 4, N. Y.
and Affiliates: MAGNOLIA PETROLEUM COMPANY, GENERAL PETROLEUM CORPORATION

Socony-Vacuum
Process Products

Process Products
SOCONY-VACUUM

CLASSIFIED ADVERTISEMENTS

MODERN PLASTICS reserves the right to accept, reject or censor classified copy.

EMPLOYMENT • BUSINESS OPPORTUNITIES • EQUIPMENT (used or resale only)

MACHINERY and EQUIPMENT FOR SALE

FOR SALE: Quick delivery Rubber and Plastic Equipment. Farrel 18" x 45", 16" x 48", and 13" x 36". 2 roll rubber mills. New 60" x 120" Lab. Mixing Mills and Calenders. Other sizes 30" to 60". Royle #2 perfected extruder, and other sizes. 300 Ton French Oil Self-contained Hydr. Press 18" Ram 18" Stroke. 180 ton F. B. Molding Press 26" x 26". Francis 175 tons 24" x 18". W.S. 115 ton 24" x 24". Also presses Lab. to 1500 tons from 12" x 12" to 48" x 48". Hydr. Oil Pumps. Watson Stillman Hor 4 plgr. 1⅛" and 2½" x 4" H & L pressure pump. HMP 10 GPM 2700 lbs. Elmes Hor. 4 plgr. 5 and 8 GPM 4500 lbs. and 5500 lbs. Hydr. Accumulators. Stokes Automatic Molding Presses. Stokes R & Colton 4T Preform Tablet Machines. Also Rotary & Single Punch Tablet Machines ½" to 3". Injection Molding Machines 2 oz. to 20 oz. Baker Perkins jacketed mixers 200 and 9 gal. Impregnating units. Leominster #0 Plastic Grinder, Mikro Pulverizers. Heavy duty mixers, grinders, pulverizers, gas boilers, etc. Partial listing. We buy your surplus machinery. Stein Equipment Co., 90 West St., New York 6, N. Y. WOrth 2-5745.

FOR SALE: Thermex Preheater, Model 2P; Airtronics Preheater, Model D E; Airtronics Preheater, Model C B. Like new. AARON MACHINERY CO., INC. WOrth 4-8233, 45 Crosby St., New York 12, N. Y.

FOR SALE: 50 Ton Stokes Presses & Pump, 200 Ton W.S. Hobbing PRESS, 300 Ton W.S. PRESS 24 x 20 Platen, 175 Ton H.P.M. PRESS 30 x 30 Platen, 150 Ton Farrel PRESS 30 x 30 Elec. Plates, 140 Ton W.S. PRESS 23 x 17 Platens, 85 Ton Stewart Boiling PRESS 20 x 20 Platen, 50 Ton Elmes PRESS with 18 x 18 Elec. Plates, 75 Ton W.S. PRESS 15 x 15 Platen, 75 Ton Adamson PRESS 20 x 20 Platens. Laboratory presses, Accumulators, Piston and Oil Pumps. AARON MACHINERY CO., INC. 45 Crosby St., N.Y.C.

SAVE WITH GUARANTEED REBUILT EQUIPMENT — HYDRAULIC PRESSES, 24" x 24", 18" ram 315 tons; 24" x 56", 450 ton multiple opening; 24" x 24", 16" ram, 250 tons; 24" x 24", 12" ram, 170 tons; 24" x 42", 2—12" rams, 340 tons, 42" x 42", 16" ram, 250 tons; 36" x 36", 12" ram, 141 tons; 20" x 18", 10" ram 118 tons; 20" x 20", 10" ram, 118 tons; 19" x 24", 10" ram, 78 tons; 22' x 15', 8' ram, 75 tons; 27" x 21", 8" ram, 75 tons; 15" x 15", 8" ram, 75 tons; 12" x 12" 7½" ram, 60 tons; 12" x 12", 6½" ram, 50 tons; 8" x 9½", 4½" ram, 20 tons; 16" x 16", 3½" ram, 12 tons; Laboratory Presses; 10 ton Carver 4" x 6". Watson Stillman 30 ton, 6" x 6"; Laboratory Millsand Calenders (NEW) M. D.; THROPP Mill 16" x 40" M. D.; NEW DUAL PUMPING UNITS, all sizes; Extruders; Royle Rubber #2, Royle Plastic #1, PREFORM PRESSES, Stokes T, Colton, 5½ T and Stokes DD84 with Reeves Drives, also Mixers, Vulcanizers, Accumulators, etc. Universal Hydraulic Machinery Company, 285 Hudson Street, New York City 13, N. Y.

FOR SALE: 1 Farrel 16" x 42" Rubber Mill complete with drive and 75 H.P. Motor; 1—French Oil Mill 300 ton self contained molding press with pushbacks; 1—125 ton Molding Press, 18" x 18". Also Grinders, Extruders, Compression and Injection Molding Presses, Mixers, etc. Send us your inquiries. Consolidated Products Co., 13-14 Park Row, New York 38, New York.

FOR SALE: 2 Hardinge hydraulic presses 240 ton No. H-1873. Completely equipped with motors, pumps, etc. 1 Stokes D-4 Pelleting Machine. 2 Steam Tables 32" x 35". 1 Cyclotherm Steam Generator, rated 1,035 lbs. steam per hour—30 H.P. Inspection in New York City. Reply Box 1127, Modern Plastics.

FOR SALE: 8 Pellet Presses: Kux model 25 (21 punch and 25 punch); Stokes D-3 and D-4. Read Co. 350 gal. heavy duty double arm sigma blade jacketed mixers. PERRY EQUIPMENT CORP., 1429 N. 6th St., Phila., 22, Pa.

FOR IMMEDIATE DELIVERY
Colton 2 and 3 RP Rotary Tablet Machines. Mikro 18H, 2TH & 4TH Pulverizers; Jay Bee, Schutz-O'Neill Mills. Baker Perkins & Readco Heavy Duty Steam Jacketed, Double Arm 50, 100, 150 gal. Mixers. Baker Perkins 150 gal. D.A. Unidor Jacketed Mixer. Baker Perkins 100 gal. D. A. Vacuum Mixers. J. H. Day 75 & 55 gal. Imperial and Cincinnatus D. A. Jacketed, Sigma Blade Mixers. Day and Ross Pony Mixers—8, 15 gal. caps. Hobart & Read Vertical Mixers, from 15 to 120 quart, with removable bowls. Day & Robinson 100 up to 4000 lbs. Dry Powder Mixers. Package Machy. FA. Miller, Hayssen 3-7 Auto. Cellophane Wrappers. This is only a partial list. Over 5000 machines in stock—rebuilt and guaranteed—available at tremendous savings.
UNION STANDARD EQUIPMENT CO.
318-322 Lafayette Street
New York 12, N. Y.

FOR SALE
One 16 ounce HPM and one 16 ounce Watson Stillman 1946 models Injection Molding Machines. Reply Box 1132, Modern Plastics.

We handle hydraulic presses, pumps, and power units of all sizes. Write us your requirements and we will try to help you. We find it impossible to list our equipment in this classified column due to the fact that the equipment is sold before ad is published. For those who seek action look in the New York Times under the Machinery and Tool Column for our regular Sunday Special. Hydraulic Sal-Press, Inc., 286-90 Warren Street, Brooklyn 2, N.Y. MAin 4-7847

FOR SALE
Two (2) Reed-Prentice 8 ounce Plastic Mold Machines, single toggle action, Model 10-D Late type.
NOLL EQUIPMENT COMPANY
4533 St. Clair Avenue
Cleveland 3, Ohio
Telephone: Express 1-0700

FOR SALE
Two 8 oz. Lester Injection Molding Machines in first class condition. Reply Box 1138, Modern Plastics.

FOR SALE: 1—2½" National Rubber Machinery plastic extruder equipped with brand new latest type screw and cylinder liners, electrically heated, self-centering crosshead with heat controls also spare oil heated crosshead. Now in operation, can make immediate delivery. Reply Box 1141, Modern Plastics.

RESIN TREATER FOR SALE
Vertical treater for impregnating paper, cloth, etc. Combination infra-red and steam 55" wide. Excellent condition. One year old. Can be seen in operation. Very reasonable. Reply Box 1144, Modern Plastics.

FOR SALE: NORTH-ERIE ¼ Gal. Laboratory Mixer; 25 Gal. Single Blade Tiltable Blender; 5 Gal. Intensive Mixer with 50 H.P. Motor; New or slightly used equipment available from stock. THE R. W. NORTH COMPANY, 1211 Parade St., Erie, Pennsylvania.

FOR SALE: Injection Presses: 4, 9, 16 oz HPM. 16 oz Watson. 22 oz Lester. 1 oz VanDorn. Extruders: NRM Lab. 1½", 2½" NRM w. crosshead. Cumberland No. O and other scrap grinders. Several Mold Temp. Controls. 2—Leiske Plaid-Dryers. 4—Minkelle Infrared Dryers. Compression Presses: 80—250 tons. 1—400 ton downstroke. Terkelsen mechanicals (5—50 tons, 2—100 tons). Various hydr. pumps. 2—3 HP gasboilers. 2—Electronic Preheaters 3 KW. Preform presses: 1—Kux No. 66, 1—Kux No. 65B, 1—Kux AS Rotary, 1—Nash Rotary Edger. 1—42" Johnstone Slitting & Rewind. machine. 1—51" Sheet Die, Takeup and Cooling unit for 2½" NRM. 1—Dipping & Drying Unit for liquid Vinyls. 4—Comb molds—(for export only). Justin Zenner, 823 W. Waeland Ave., Chicago 13, Ill.

INJECTION MOLDING MACHINES
4-Oz. H.P.M. late, excellent ..... Offers
4-Oz. REED Mod 5A, new '50, excel ... Offers
6-Oz. WATSON STILLMAN, new '42.. 5,950.
8-Oz. REED Mod. 10-D, new '48..... 12,500.
9-Oz. H.P.M. Mod. 200H9, new '40..... 6,000.
16-Oz. REED, new '46 complete..... Offers
16-Oz. LESTER, new '46, excel ..... Offers
22-Oz. LESTER, Rebilt, new '44, Mod. L-3 17,500.
22-Oz. REED, Mod. 10-H, new '46..... 19,500.
32-Oz. & 48-80-Oz. IMPCO, also others avail.
HYD. COMPRESSION PRESSES
450 T. H.P.M. new '46, w/turbo, excel. Offers
350 T. SOUTHWARK, 18" St. 24x24" pl. 2,975.
350 T. H.P.M. Self-Cont. new '46..... 12,500.
200 T. FARREL 14" ram, 24x24" pl.... 1,750.
170 T. BURROUGHS Trans.. 14" St. (2) 1,850.
100 T. LAPOINTE, Self-Cont. 13" St.. 1,950.
75 T. STANDARD, '40, Vert. & Horiz. 1,975.
50 T. WS & JOHNSON, others avail. 650. up
BALL & JEWEL Gr. #2½, 75 HP, com. 3,000.
MISCELLANEOUS & PUMPS
ELMES HYD. PUMPS w/ACCUMULATOR 240 GPM, 1500-2500# p.s.i. ..... Offers
WILSON SNYDER Hyd. Pump, 25 GPM, compl. ..... 6,000.
VICKERS Hyd. Pump, Mod. V135, 17 GPM 750.
B&S Gear Pump & Allis 5 HP 1000#p.s.i. 200.
NAT'L Accumulator Pressure Vessels... 900.
I. R. Compressor & Vac. Pump 18"x6".. 650.
PHENOLIC POWDER PLANT, 200,000# per mo. ..... Offers
PLASTIC GRINDERS & EXTRUDERS
STOKES, Mod. DD3, 23 Stat. rotary. 11"x2" ..... 5,500.
CUMBERLAND, Mod. O, 3 HP..... 375.
DeMATTIA GRINDER (2), 5 H.P. rebilt. new '46 ..... 900.
NAT'L RUBBER EXTRUDER, complete, excel. ..... 6,500.
SCHUTZ-O'NEIL Pulverizer, 20 HP. #D 950.
EVEREADY CO. E. J. McCallum, Prop. 805 Housatonic Ave. 4-9471 Bridgeport, Conn.

STOKES DD 2 Preform press, complete with punches and dies. With Reeves variable speed. Late model. Like New. Very low price. Reply Box 1145, Modern Plastics.

FOR SALE. 1½ oz injection press, USCO, air operated, with Wheelco control. Has been used only on experimental work. An excellent, fast press. P. E. Co., 2921 Middlefield Road, Redwood City, Calif.

PLASTIC INJECTION MOLDING MACHINES
for Immediate Sale
Two—22 oz. Reed-Prentice
New 1946—$18,000 each
Two—8 oz. Reed-Prentice
New 1946—$11,000 each
Reply Box 1124, Modern Plastics.

FOR SALE: 12 Ounce DeMattia Injection Molding Machine with spare cylinder; also 12 Ounce Lester Injection Molding Machine. Both Machines can be seen in operation. Reply Box 1123, Modern Plastics.

INJECTION MOLDING MACHINES
8 oz. Lester Model L-2½ $8,500.00. 4 oz. Reed-Prentice Model 10-A $3,000.00. Machines can be inspected in New York.
ALFRED A. ROSENTHAL
3 Park Row
New York 38, N.Y.
REctor 2-2747.

MACHINERY and EQUIPMENT WANTED

MOLD WANTED for injection molding. We will buy one mold or a complete line or series of molds for finished resalable items. Housewares, toys, novelties, etc. Will also buy molds for industrial parts such as handles, knobs, drawer pulls, gears. All items for resale in U. S. A. Send detailed information to Victory Manufacturing Company, 1722 W. Arcade Place, Chicago 12, Illinois.

(*Continued on page 204*)

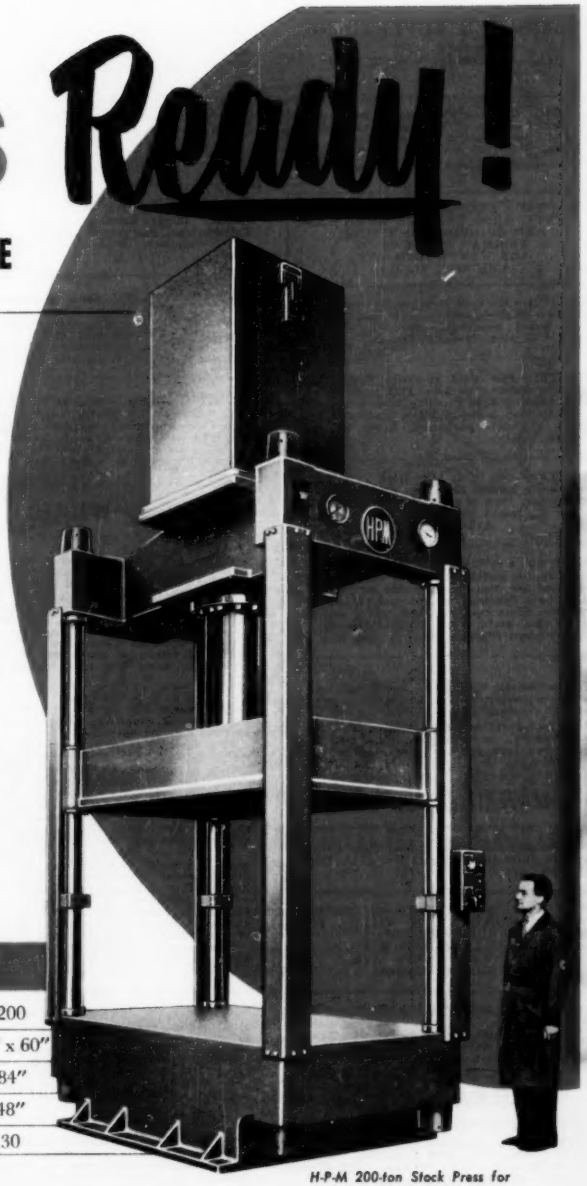
H-P-M's Ready!

with a STANDARD LINE of PRESSES for REINFORCED PLASTICS

Yes, H-P-M has kept pace with the rapid developments in the molding of reinforced plastics! By working closely with Owens-Corning, the firm who developed Fiberglas molding, a stock line of H-P-M presses has been designed to meet the requirements of this new molding industry.

Each press is a self-contained unit, powered by dependable H-P-M built pumps, valves and controls. Semi-automatic control provides fast closing action . . . automatic slow-downs . . . and accurately controlled pressures with press cycles to meet exacting production needs.

Are you planning to use this new "wonder" plastic? If so, write for H-P-M's stock press bulletin No. 5107.



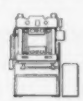
H-P-M 200-ton Stock Press for Molding Reinforced Plastics

SPECIFICATIONS

Tonnage	100	150	200
Mold Size (max.)	48" x 36"	60" x 48"	84" x 60"
Daylight	84"	84"	84"
Stroke	48"	48"	48"
Motor HP	10	10	30

HPM

PLASTICS MACHINES FOR EVERY MOLDING JOB


COMPRESSION

INJECTION

TRANSFER

THE HYDRAULIC PRESS MFG. CO.

101 MARION RD., MT. GILEAD, OHIO, U. S. A.

CLASSIFIED ADVERTISING

(Continued from page 202)

WILL BUY small injection moulding plant complete, or late model 2 oz., 4 oz., and 8 oz. presses in good condition. Reply Box 1120, Modern Plastics.

WANTED: EXTRUDER 2½" to 6" CAPACITY. ALSO RELATED EQUIPMENT AND GRINDING EQUIPMENT. FISHMAN PLASTICS CO. 6423 WENTWORTH AVE. CHICAGO, 21, ILL.

WANTED—One used 16-ounce Watson-Stillman injection molding machine, 1947 model or later. State price, condition, and date purchased. Reply Box 1139, Modern Plastics.

WANTED—One used 16-ounce Reed-Prentice injection molding machine, 1947 model or later. Also 8-ounce Reed-Prentice injection molding machine, 1948 model or later. State price, condition, and date purchased. Reply Box 1140, Modern Plastics.

WANTED—One 2" or 1½" High Temperature, electrically heated, Extruder. State make, condition, age, type of screw, and price. Joseph Davis Plastics Co. Arlington, N. J.

WANTED: 4 to 8 opening laminating hydraulic press approximately 38"x74" or larger. Must be equipped for steam heating and water cooling. Must have hydraulic pumps and all necessary controls. State age, condition, price, and location. Also, state when available. Reply Box 1118, Modern Plastics.

WANTED
Used automatic hinged top phonograph record-press approximate 110 ton capacity suitable for 12" records.
Used horizontal injection molding machine 16 oz. capacity, including stuffer arrangement. Reply Box 1149, Modern Plastics.

MATERIALS FOR SALE

FOR SALE: 30,000 lbs. Crystal Clear Cellulose Acetate Sheet Scrap. Reply Box 1133, Modern Plastics.

FOR SALE: ALL GRADES OF THERMOPLASTIC REGROUND OR VIRGIN. YOUR INQUIRY HANDLED PROMPTLY. FISHMAN PLASTICS CO. 6423 WENTWORTH AVE. CHICAGO, 21, ILL.

LUCITE—PLEXIGLASS—GLACITE SHEETS —CAST RODS Always in stock—we deliver. PLASTIC GLASS CORP., 33 Ave. P., Newark 5, N. J., Mu 7-6477

MATERIALS WANTED

WANTED: Plastic scrap, rejects, and surplus molding compounds, such as Cellulose Acetate, Vinyls, Acrylic, Ethyl Cellulose, Polystyrene, Butyrate, etc. Also custom grinding, cleaning, and reprocessing of your own plastic scrap. Reply Claude P. Bamberger, Inc., 225 Wooster St., New York 12, N. Y. Tel: SPring 7-0933.

WANTED: Rigid Vinyl scrap in any form. Will purchase accumulations on contract basis if desirable as we are steady users. Reply Box 1134, Modern Plastics.

Wanted: Plexiglas or Lucite cut offs, in .060 and .080 colorless transparent and masked. Can use any quantity. Keborts Plastic House, 1232 Melbourne Rd., Cleveland 12, Ohio.

WANTED ALL GRADES OF THERMOPLASTIC MATERIALS IN ANY SHAPE OR FORM. SCRAP—REGROUND OR VIRGIN. FISHMAN PLASTICS CO. 6423 WENTWORTH AVE., CHICAGO, 21, ILL.

WANTED: PLASTIC SCRAP or REJECTS in any form: Cellulose Acetate, Butyrate, Polyethylene, Polystyrene, Vinyl, Acrylic and Ethyl Cellulose. Reply Box 1115, Modern Plastics.

WANTED: PLASTIC Scrap or Rejects in any form. Acetate Butyrate, Polystyrene, Acrylic, Vinyl Polyethylene, etc. Also wanted surplus lots of phenolic and urea molding materials. Custom grinding, magnetizing and compounding. Reply Box 1114, Modern Plastics.

WANTED: Plastic Scrap, Rigid Vinyl, Cellulose Acetate, Polystyrene, Polyethylene, Butyrate, Custom grinding, magnetizing, compounding, and straining of contaminated plastics. Franklin Jeffrey Corporation, 1671 McDonald Avenue, Brooklyn, N. Y. ES 5-7943.

HELP WANTED

WANTED: Graduate engineer with approximately five years experience in testing or application of plastic materials, primarily thermosetting and thermoplastic molding materials and laminates, having a good knowledge of their physical properties. Position in Plastics Laboratory of large New York State manufacturer of precision electro-mechanical devices. Send full details of education and industrial experience. Reply Box 1116, Modern Plastics.

Large Midwestern Proprietory Molder needs two men for expanding compression and injection molding operations:

Fl. opening requires man with experience and ability in mold design, material specification, estimating mold and piece price, complete familiarity with materials, machines, molding techniques and finishing operations for present day plastic materials: Ability to supervise and head up department doing this work with experience in customer contact desirable. Salary depends upon experience and ability.

We have an opening also for experienced mold and molding technician: Man we need must be capable of taking new mold and working up standard operating cycles completely with a minimum of supervision. Thorough knowledge of materials and molding techniques necessary. Time study experience and knowledge of inspection methods desirable.

Send complete details and work record with first application. Reply Box 1117, Modern Plastics.

PLASTIC SALES ENGINEER
Mid-Western material manufacturer desires full time Sales Engineer for eastern territory. Must have experience in compression, transfer and plunger molding of thermostatic materials. Sales experience desirable. State salary requirement and background in letter. Reply Box 1119, Modern Plastics.

PLASTIC RESEARCH CHEMIST
Midwestern material manufacturer desires research chemist experience in Phenolic and Melamine Moulding Compounds and Laminates. Give background and salary requirements in letter. Reply Box 1131, Modern Plastics.

Wanted: Factory Supt. Experienced in Fibreglas re-inforced Polyester Resins. Excellent opportunity for right man. Answer in detail. Replies held in confidence. Our own employees know of this ad. Reply Box 1142.

CHEMIST OR CHEMICAL ENGINEER
One of the leading chemical companies desires chemist or chemical engineer to do laboratory research on end uses for new products developed in existing research department. At least 3 years experience essential in one or more of following products: waxes, paper coatings, polyethylenes and other plastics. Permanent position, good salary, liberal employment benefits. Give complete information in letter. Replies confidential. Reply Box 1121, Modern Plastics.

SALESMAN
For custom molding by well established molders in Northern New Jersey. Modern Plant, designing, engineering and tooling facilities. Excellent opportunity for high caliber man. Liberal drawing account and commission. Submit resume Box 1122, Modern Plastics.

COATER ENGINEER OR FOREMAN—Excellent opportunity for experienced man to assume responsibility over new department being set up in old, established firm. Experience necessary with organisols and plastisols. Reply stating all personal qualifications and business experience. All replies confidential. Reply Box 1135, Modern Plastics.

WANTED
SALES EXECUTIVE
Injection Molding
Well known New England company seeks experienced salesman who knows his way around users of injection molding, industrial as well as consumer products. To man with following we offer close association. Drawing account and commissions. Reply Box 1137, Modern Plastics.

ENGINEER
MOLDING
Engineer with some experience in molding thermosetting materials and high speed compression molding techniques. Permanent position in our Philadelphia plant.
INTERNATIONAL RESISTANCE CO.
401 N. Broad Street
Philadelphia 8, Pa.

WANTED
Cold molded products research and production engineer to establish cold mold operation for electrical manufacturing concern. Requires knowledge of materials and equipment used in mixing, molding, curing and impregnating. Salary commensurate with experience. If interested, send application with resume of education and experience, small photograph and salary expected. Reply Box 1136, Modern Plastics.

Established medium sized New England manufacturing company has opening for a man with basic and practical education in PLASTICS and HIGH STYRENE POLYMERS.

The company offers permanent position to a man who will fit into its organization and who will be able to add to its research staff experience, ability and ideas to further the development of its Plastics Department. Reply Box 1146, Modern Plastics.

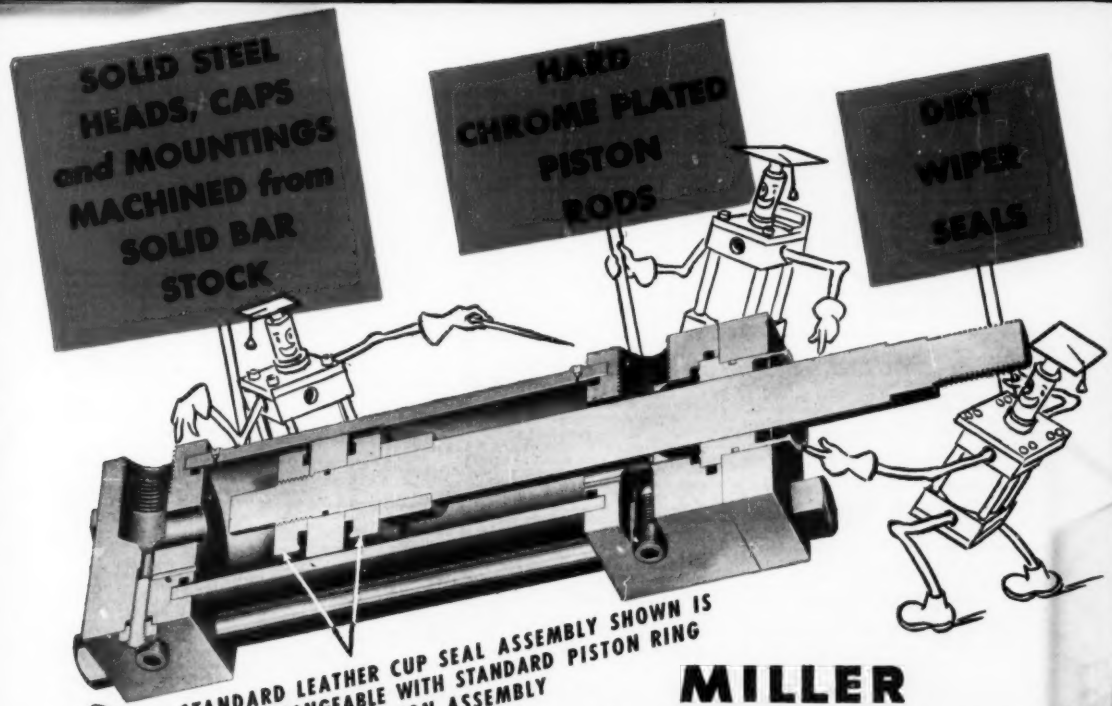
MANUFACTURERS REPRESENTATIVES: a leading fabricator of the Acrylic Plastics and Royalite is seeking representatives whose records can stand thorough investigation. If you have substantial contacts with industrial firms and have some technical knowledge of how these plastics fit into this field, write immediately, giving complete details in your first letter. All replies confidential. Reply Box 1147, Modern Plastics.

(Continued on page 206)

All classified advertisements payable in advance of publication

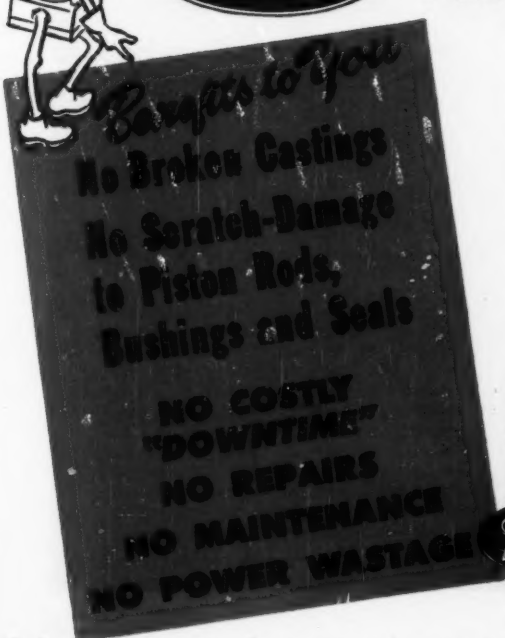
Up to 60 words $7.50	Up to 120 words $15.00	Up to 180 words $22.50
Up to 60 words (boxed) ... $15.00	Up to 120 words (boxed) ... $30.00	Up to 180 words (boxed) ... $45.00

For further information address Classified Advertising Department, Modern Plastics, 575 Madison Avenue, N. Y. 22, N. Y.



STANDARD LEATHER CUP SEAL ASSEMBLY SHOWN IS INTERCHANGEABLE WITH STANDARD PISTON RING PISTON ASSEMBLY

MILLER
High Pressure
HYDRAULIC CYLINDERS
Meet J. I. C. HYDRAULIC STANDARDS



Sales and Service from coast to coast

(Write for FREE Copy of these "Standards")

Years before the Joint Industry Conference (J. I. C.) Standards for specifying "quality" hydraulic equipment were adopted, the *standard* design and construction features of Miller High Pressure Hydraulic (2000-3500 psi) Cylinders already included ALL the specifications for cylinders, seals and pistons now called for by the "Standards". Hard chrome plated, scratch-resistant piston rods and dirt wipers have long been standard Miller cylinder features yet are required by the "Standards" only under severe conditions.

Solid steel heads, caps and mountings which eliminate costly, dangerous breakage even under the severest operating conditions represent an "extra-quality" standard Miller cylinder feature which actually exceeds the high quality set by the J. I. C. Standards.

The Miller "Patented" Hydraulic Piston Rod Seal which has no manual adjustment and is automatically self-adjusting and wear-compensating to give life-long leakproof service without ever requiring any manual adjustment whatsoever . . . far surpasses the requirement of J. I. C. Standard H6.2.5 which specifies "Stuffing boxes for automatic packing shall be so designed as to prevent adjustment beyond the functional limits of the packing"

Write for illustrated cylinder bulletins A-105 and H-104

COMPLETE MILLER CYLINDER LINE INCLUDES: AIR CYLINDERS, 1½" to 20" BORES, 200 PSI OPERATION; LO PRESSURE HYDRAULIC CYLINDERS, 1½" TO 6" BORES FOR 500 PSI OPERATION, 8" TO 14" BORES F 250 PSI; HIGH PRESSURE HYDRAULIC CYLINDERS, 1½" TO 12" BORES, 2000-3000 PSI OPERATION. MOUNTING STYLES AVAILABLE.

MILLER MOTOR COMPANY

2020 N. Hawthorne, Melrose Park, Ill.

AIR AND HYDRAULIC CYLINDERS · ACCUMULATORS · COUNTERBALANCE CYLINDERS · BOOSTERS · GAS HOI

CLEVELAND — PITTSBURGH — PHILADELPHIA — DETROIT — YOUNGSTOWN — BOSTON
HARTFORD — NEW YORK CITY — DAYTON — ST. PAUL — FORT WAYNE — INDIANAPOLIS
MILWAUKEE — NASHVILLE — SEATTLE — LOS ANGELES — SAN FRANCISCO — BALTIMORE
ST. LOUIS and OTHER AREAS.

CLASSIFIED ADVERTISING

(*Continued from page 204*)

Plastic Executive Engineer. Wonderful opportunity for executive to head engineering and production of rapidly expanding plant. Must be able to set-up and supervise injection, compression, low-pressure laminating and deep-drawing operation. Plant expanding twofold. Located in the heart of the Southwest, land of the last good opportunities. Rush complete particulars and photo to:

Loma Plastics, Inc.
Box 11277
Fort Worth, Texas

PLASTICS ENGINEER: Excellent opportunity for man with injection molding experience, age 30 to 40, to become connected with progressive, medium sized plant. Must be able to estimate injection mold costs, supervise the design and construction of dies, understand set-up and molding problems, and be capable of developing new products. Replies confidential. Write complete details. Reply Box 1148, Modern Plastics.

SITUATIONS WANTED

PLASTICS MOLDING ENGINEER: Broad experience in all phases of injection, compression, and transfer molding of large and small parts, and accessory operations. Also experienced in product design, estimating, methods, standards. Age 40. Will locate to suit. A seasoned engineer who can deliver the goods. Interested in qualifying for a position of a permanent nature. Reply Box 1126, Modern Plastics.

DON'T LOOK any more—If you are interested in a . . .

Personable young man, sales experienced and skilled worker, with a college background, who seeks employment with an injection or extrusion molder. Highest references furnished. Reply Box 1125, Modern Plastics.

REINFORCED PLASTICS ENGINEER: 9 years as manager low pressure molding department and director of research of prominent Eastern company, developer variety of successful peacetime and war products, thoroughly experienced in polyester resins, low cost core construction, molded plywood. Competent to take full charge of production and development. Immediately available. Reply Box 1143, Modern Plastics.

PLASTICS ENGINEERING position wanted by young chemical engineer with two years experience: Molding powder production and formulation, color matching, and scrap reworking of thermoplastic materials; resin and adhesives production and formulation of thermosetting materials. This includes supervisory experience. Desire responsible position in development and production work. Reply Box 1130, Modern Plastics.

MISCELLANEOUS

FOR SALE
TWO PLASTIC HOUSEHOLD ITEMS
THAT ARE REALLY "HOT"!

We manufacture an extensive line of plastic toys. For several years we have also manufactured and sold two extremely popular and profitable plastic household items that have been marketed in every state in the Union. These items do not fit into our line. We want to divert that same manufacturing and selling time to our regular line. Everything pertaining to these household items will be sold lock, stock and barrel . . . at a sacrifice price because we want to move fast. If you are manufacturing and selling plastics merchandise to the household market you certainly should investigate this offer . . . now! The market has been established. It's a bargain for somebody! Reply Box 1129, Modern Plastics.

Wanted: Will purchase interest in a plastic molding plant. As patentee possess revolutionary patent on sleeping eyes and other members of doll, also on a cover for a paper container which sanitarily holds plastic spoon, knife or fork to remove contents. Oke L. Pearson, 13 Circle Ave., Camp Grounds, Des Plaines, Ill.

"MANUFACTURER WANTED"—for Cosmetic Jar of ball-like design, with rounded inside; desire quantity 4-oz. size; material opaque Polyethylene jar, light grey,—fitted with silver metal cap; Polyethylene jar in light yellow, with gold metal cap; separate design coat-of-arms raised on caps of continued ball shape. Designs of wood models ready. Communicate immediately—P.O. Box 7544, WASHINGTON 4, D.C.

MOLDER OF INFANT'S ITEMS
THIS MAY BE YOUR
GOLDEN OPPORTUNITY!

We have sold a beautiful, staple, year around item which has a national reputation and an excellent sales record in the infant's market. Our molds, fixtures and complete list of accounts will be sold at a bargain price! This highly saleable item is to be sacrificed for a very sound reason. We are a highly diversified company and do not have any other infant's item to allow us to promote, merchandise and aggressively sell this one at anywhere near its market potential. If interested contact us . . . you will quickly recognize this beautiful item when you see it. Investigate now! A wonderful item for the right company. Reply Box 1128, Modern Plastics.

"Experienced engineering sales organization offers Midwest molder and extruder profitable sales representation Atlantic seaboard. Commission basis only. Technical Product Company, 369 Lexington Avenue, N. Y. C."

PLASTIC LENSES WANTED
APPROX. 3 POWER MAGNIFICATION.
⅛" DIAMETER X 1½" FOCUL LENGTH.
Royal Magic & Novelty Company
20 East 17th Street, New York 3, N.Y.

Inventions Wanted: First-Class manufacturer wants inventions using plastics and steel. We can build the molds and dies, run the production, and sell your product. Also interested in buying established businesses. Will pay royalty on existing manufacturing items that we can manufacture and sell. Write Albert E. Payne, owner-manager, THE PAYNE TOOL AND ENGR. CO., SPRINGFIELD, OHIO. Strictly confidential.

CUSTOM *Injection* MOLDING

28 Years Experience
Product Design • Mold Making

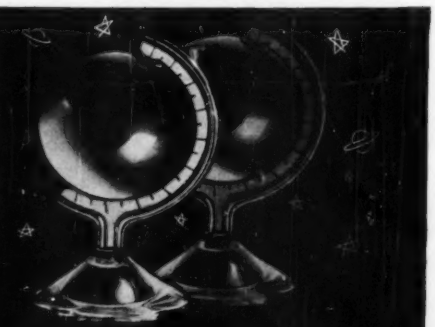
Assembly
PAINTING
Metallizing

"EYE APPEAL"
Your Products
With Our New
DECORPLAS
Process

PRESSES
1 to 32 oz.

Materials:
Styrene
Lucite
Acetate
Butyrate, etc.

JAMISON PLASTIC CORP.
11 W. 42nd St., New York 18 • LO 4-0176
Plant: 71 E. Sunrise Highway, Freeport, L. I. 8-8400



Out Of This World . . .

From "Out Of This World" comes salt, pepper, and a distinctly global flavor well in keeping with current American interest in world events.

A handsome addition to any breakfast table, the "Out Of This World" Salt-N-Pepper set features richly colored globes which rotate realistically on a stunning gold axis set in a translucent base.

We're injection molding these useful and attractive miniatures for D'Art Craftsman, Inc., of New York, proving once more that we know how to provide out-of-this-world results at costs that are strictly down-to-earth.

CONNECTICUT PLASTIC PRODUCTS CO., INC.
70 West Liberty Street, Waterbury, Conn.

ORGANIC PEROXIDES

LUPERSOL* DDM

60% METHYL ETHYL KETONE PEROXIDE IN DIMETHYL PHTHALATE

WATER WHITE LIQUID

11% ACTIVE OXYGEN

LOW TEMPERATURE CATALYST FOR POLYESTER RESINS

TECHNICAL DATA AND SAMPLES AVAILABLE UPON REQUEST

*REGISTERED TRADE MARK

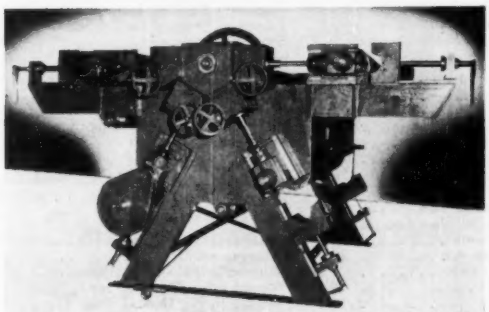
LUCIDOL DIVISION

NOVADEL-AGENE CORPORATION
BUFFALO 5, NEW YORK

FOUR COLOR LEMBO

printing machine for vinyl and polyethylene films

- Handwheel or motor controlled register units assuring accurate register at all speeds
- no exposed gearing
- Repeats in patterns from 14" to 72" and larger upon request



Write for our new illustrated brochure

LEMBO *machine works, inc.*

248 East 17th St. Paterson 4, N. J.

Manufacturers of Printing Presses and Cylinders

If you have to HOLD Anything in your production operations

Hold EVERYTHING with "DE-STA-CO" Toggle Clamps in plastic bonding, machining and assembly. • Fast clamping, positive holding pressures, instantaneous release Toggle Clamps speed up your operations and cut your costs. • There are more than 40 different Toggle Clamps manufactured by Detroit Stamping Company in various types and sizes to meet industry's requirements.

Model 424 Portable Plier Clamp

For one-hand use in cramped work areas and small space. Deep jaw capacity but only 4½" in length.

Model 650 Heavy Duty Plunger Clamp

For "push-pull" work-holding jobs where considerable pressure is needed. Capacity up to 4000 lbs.

Model 235-U Retractable Clamp (Not illustrated)

Quick, unimpeded loading and unloading of fixtures easily possible with this one. Up to 750 lbs. pressure.

Ask for "DE-STA-CO" Toggle Clamp Catalog and name of representative nearest you who is stocking our entire line of Toggle Clamps.

DE-STA-CO DETROIT STAMPING COMPANY
327 MIDLAND AVE. • DETROIT 3, MICH.

INDEX OF ADVERTISERS

AUGUST 1951

Ace Plastic Company 172
Acheson Colloids Corporation ... 183
Acromark Company, The 146
Adamson United Company 63
Advance Solvents & Chem. Corp. 144
Aldrich Pump Company, The... 24
Allied Chemical & Dye Corp., The Barrett Div. 143
American Cyanamid Company, Calco Div. 125
American Cyanamid Company, Plastics Dept. 108, 109
American Molding Powder & Chemical Corp. 177
American Pulverizer Co. 158
American Steel Foundries, Elmes Engineering Division 153
American Wheelabrator & Equipment Corp. 145
Amos Molded Plastics 26
Amplex Manufacturing Co. 156
Amsco Packaging Machinery, Inc. 175
Anderson Bros. Mfg. Co. 177
Apex Machine Mfg. Corp. 187
Atlas Electric Devices Co. 130
Atlas Valve Company 163

B. I. P. Tools Limited 58
Bakelite Company, Division of Union Carbide & Carbon Corp. ..... Inside Back Cover
Bamberger, A., Corp. 46
Barrett Division, The, Allied Chemical & Dye Corp. 143
Beeker, Moore & Co., Inc. 154
Bellows Company, The 155
Black-Clawson Co., The, Dilts Machine Works 159
Boonton Molding Co. 54
Borden Company, The 139
Brookfield Engineering Labs., Inc. 163
Brown Company (Paper) 173

Cadillac Plastic Company 147
Cady, E. J., & Company 176
Cambridge Molded Plastics Co... 150
Carborundum Company, The ... 47
Carter Products Company, Inc... 209
Carver, Fred S., Inc. 137
Catalin Corporation of America.. 1
Cavagnaro, John J. 132
Celanese Corporation of America Plastics Div. 9
Central Molded Products 154
Chicago Molded Products Corp.. 4
Chicago Show Printing Co. 60
Cincinnati Grinders Inc. 64
Classified 202, 204, 206
Clopay Corporation 51
Conforming Matrix Corp. 154
Connecticut Plastic Products.... 206
Continental Can Co. 141
Cruver Mfg. Company 32
Crystal Plastics, Inc. 136
Cumberland Engineering Company, Inc. 59

Daniels, T. H. & J., Ltd. 147
Deakin, J. Arthur, & Son 144
Deecy Products Co. 159
DeMattia Machine & Tool Co.... 28
Detroit Stamping Co. 207
Diamond Alkali Company 50
Dilts Machine Works, Div., The Black-Clawson Co. 159
Disston, Henry & Sons, Inc. 14
Distillation Products Industries. 42
Dow Chemical Co., The 61, 193
Drew, E. F., & Co., Inc. 65
DuBois Plastic Products, Inc.... 184
Dunning & Boschert Press Co., Inc. 144
du Pont de Nemours, E. I., & Co. (Polychemicals Dept.) 7
Durez Plastics & Chemicals, Inc. ..... Inside Front Cover

Eastman Kodak Company, Cellulose Prods. Div. 135
Electric Auto-Lite Co., The Instrument & Gauge Div. 132
Elmes Engineering Div., American Steel Foundries 153
Emery Industries, Inc. 72
Erie Resistor Corp. 10
Erinoid Limited 19

Fabricon Products, Inc. 136
Farrel-Birmingham Company, Inc. 55
Fellows Gear Shaper Co., The... 71
Fiberite Corporation 175
Flinkote Company, The 56

General Electric Co. .. 67, Back Cover
General Industries Co., The 68
Gering Products, Inc. 209, 187, 161, 131
Girdler Corporation, The 151
Goodrich, B. F., Chemical Co., The 3
Goodyear Tire & Rubber Co... 21, 33
Gries Reproducer Corp. 195

Hercules Powder Co. 25
Hobbs Mfg. Co. 197
Holliday, W. J., & Co. 189
Hydraulic Press Mfg. Co., The... 203

Iddon Bros Ltd. 52
Ideal Plastics Corporation 22, 23
Improved Paper Machinery Corp. 188
Industrial Heater Co., Inc. 209
Industrial Plastics Co. 31
Industrial Research Laboratories, Ltd. 186
International Plastics Exhibition. 40

Jackson & Church Co. 180, 181
Jamison, R., Plastics 206

Kentucky Color & Chemical Co., Inc. 195
Kingsley Stamping Machine Co.. 185
Koppers Company, Inc. 41
Krieger Color & Chemical Co., Inc. 195
Kuhn & Jacob Molding & Tool Co. 167
Kurz-Kasch, Inc. 17

Lane, J. H. & Co. Inc. 156
Lembo Machine Works, Inc. ... 207
Lewis Welding & Engineering Corp. 160
Lind Plastic Products 178
Lucidol Division, Novadel-Agene Corp. 207

Mack Molding Co., Inc. 163
Manufacturers' Literature .. 169, 170
Marblette Corp. 112
Metal & Thermit Corp. 172
Metalmasters, Inc. 62
Metaplast Process, Inc. 168
Michigan Chrome & Chemical Co. 137
Michigan Molded Plastics, Inc. .. 152
Mid-America Plastics, Inc. 43
Midland Die & Engraving Co.... 98
Miller, Frank & Sons 161
Miller Motor Company 205
Mills, Elmer E., Corp. 37
Mirro-Plex, Inc. 183
Mitts & Merrill 185
Modern Plastic Machinery Corp.. 13
Molded Products Corp. 38
Monsanto Chemical Co., Organic Chemicals Division 199
Monsanto Chemical Co., Plastics Division 53
Mosinee Paper Mills Co. 119
Moslo Machinery Company 43
Mount Hope Machinery Co. 146
Mt. Vernon-Woodberry Mills ... 164
Muehlstein, H., & Company 185

Nash, J. M., Company 138
National Erie Corp. 175
National Forge & Ordnance Co... 178
National Rubber Machinery Co... 36
Naugatuck Chemical Co. 121, 129
New Hermes, Inc. 157
Newark Die Company 147
Nixon Nitration Works 16
Nordan Plastics Corp. 173
Northern Industrial Chemical Co. 130

Olsen, Tinius, Testing Machine Co. 18
Orange Products, Inc. 159
Owens-Corning Fiberglas Corp. . 179

Palmer, Homer W. & Company, Inc. 188
Parker-Kalon Corp. 48
Pittsburgh Coke & Chemical Co. 69
Plaskon Division, Libbey-Owens-Ford Glass Company 101-104
Plastic Research Products 12
Plax Corporation 34, 35
Preis, H. P., Engraving Machine Co. 177
Progressive Machine Co., Inc.... 152
Projectile & Engineering Co., Ltd., The 8
Prophylactic Brush Company .. 49

Quinn-Berry Corp. 45

Radio Receptor Co., Inc. 70
Reed-Prentice Corporation 11
Reichhold Chemical Co. 127
Rhodes, M. H., Inc. 137
Richardson Company, The 6
Rogers Corp. 27
Royal Tool Co. 157

Safety Car Heating & Lighting Co. 161
Scott, Geo. S., Mfg. Co. 197
Scranton Plastic Laminating Corp. 158
Shaw, Francis, & Company, Ltd. 44
Sinko Mfg. & Tool Co. 132
Socony-Vacuum Oil Co., Inc. ... 201
Standard Tool Co. 168
Stanley Chemical Co. 162
Sterling, Inc. 183
Stokes, F. J., Machine Co. 30
Stone & Webster Eng. Corp. 191
Sturtevant Mill Company 66
Superior Plastics, Inc. 165
Swedlow Plastics Co. 57
Syntron Company 130

Tennessee Eastman Company .. 115
Timken Roller Bearing Co., The. 123
Tinnerman Products, Inc. 20
Toledo Scale Co. 187
Tri-State Plastic Molding Co. ... 173
Tupper Corporation 29

Union Carbide & Carbon Corp., Bakelite Co. ... Inside Back Cover
United States Rubber Co. .. 166, 167

Van Dorn Iron Works Co., The.. 149

Waterbury Companies, Inc. 182
Watertown Mfg. Co. 171
Watson-Stillman Co., The 15
Westchester Plastics, Inc. 133
White, S. S., Dental Mfg. Co. .. 188
Wiegand, Edwin L., Company .. 39
Windsor, R. H., Ltd. 117
Wood, R. D., Company 195
Worcester Moulded Plastics Co. .. 210

MODERN PLASTICS

575 MADISON AVENUE • NEW YORK 22, N.Y.

COMPLETE
PLASTIC Scrap SERVICE

Our 30 years' expert know-how and large facilities are your guarantee of complete satisfaction.

WE BUY....

Thermoplastic Scrap, All Types and Forms

POLYSTYRENE - VINYLS - NYLON
ETHYL CELLULOSE
POLYETHYLENE - ACETATE
BUTYRATE - ACRYLICS

WE CUSTOM COMPOUND

your materials, and offer these special services:

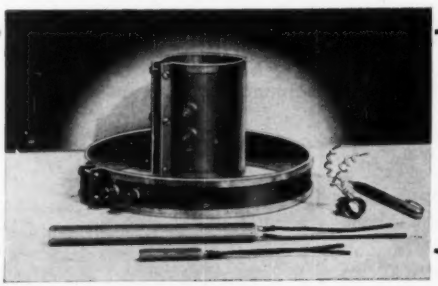
SORTING, SEPARATING,
GRINDING, DE-CONTAMINATING,
COLOR-MATCHING,
PELLETIZING

WRITE • WIRE • CABLE • PHONE
SAVE MONEY - - - SAVE RESOURCES

Dept. MP

GERING PRODUCTS INC.
KENILWORTH, N. J.

HEAT FOR PLASTIC PROCESSING
You specify the size



ELECTRIC HEATERS of ALL TYPES
• For Machine Parts
• For Liquids
• For Air

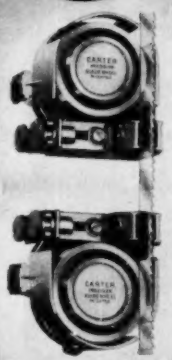
ALSO SPECIAL REQUIREMENTS
INDUSTRIAL HEATER CO., INC.
1921-1951
245 Canal St. New York 13, N. Y.

Carter

CUTS COSTS WAY DOWN!

CARTER MICRO-PRECISION GUIDE

Now! Carter introduces its new line of ball-bearing and Oilite Precision Guides for all sized bandsaws. Carter products universally accepted as standard equipment by leading bandsaw manufacturers.



MODEL	LARGE	MED.	SMALL
BALL BEARING WHEEL	$15.00	$13.50	$12.00
OILITE WHEEL	$10.00	$ 8.50	$ 7.00
SAWS	⅛"-1¾"	⅛"-1¼"	⅛"-¾"

PRICES SUBJECT TO CHANGE

Write For free illustrated folder!

CARTER PRODUCTS COMPANY INC.
53 Mount Vernon, N.W., Grand Rapids 4, Mich.

Plastically Speaking

WE DID IT BEFORE
WE'LL DO IT AGAIN

During World War II many of our customers working on defense items involving plastics called on us to plan and mould their plastic parts for them. Our knowledge of government requirements, our extensive custom injection moulding facilities, and our experienced personnel guaranteed them a plastic success from start to finish. We were rewarded with the plaudits of satisfied customers and 5 Army and Navy E awards from the government!

Manufacturers who have contracted for defense work, using plastic parts, will find Worcester Moulded Plastics more than ever ready, willing and able to be of assistance. Give us an opportunity to work as your ally on defense. You can stake your reputation on our quality.

Custom Mouldings of Custom Made Quality

Custom Injection Moulding

WORCESTER MOULDED PLASTICS CO.

14 HYGEIA STREET, WORCESTER 8, MASS.

17 East 42nd St., New York 17, N. Y.

THE TREE BEHIND THE TREE

The tree behind the tree is the tree you never see. It's the margin of waste that is being redeemed by *Resineering.* Great advances are being made by applying engineering principles to improve wood, paper and pulp products through the use of BAKELITE Phenolic, Urea, and Resorcinol Resins.

Here are a few examples, in brief, of getting more out of our forests through *Resineering:*

Resin adhesives are employed for the gluing of fine furniture, exterior and interior grades of plywood, and marine and aircraft sections.

Wood aggregates using these resins as binders, are molded into furniture and structural components and into boards having many uses.

Resin-treated paper stocks acquire new properties, such as strength and moisture-resistance, that permit their use as masking and surfacing sheets for plywood. A related development—resin-impregnated crossbanding sheet—upgrades plywood by hiding knots, cracks and other imperfections, and minimizing warpage.

Pulps reinforced with resins added at the beater, are further processed into such products as wet-strength paper bags, rigid building board, and preforms for molded plastic products of high impact resistance and fine surface finish.

Treated paper is formed into rigid honeycomb cores that provide extremely high strength-weight ratios for such uses as aircraft flooring, truck paneling, furniture, fixtures.

These examples of *Resineering* applied to wood, paper, and pulp products may suggest answers to some of your problems. Address inquiries to Dept. CH-13.

BAKELITE
TRADE-MARK
PHENOLIC, UREA and RESORCINOL RESINS

TRADE MARK

BAKELITE COMPANY
A Division of
Union Carbide and Carbon Corporation
30 East 42nd Street, New York 17, N. Y.

One of a series of messages to design engineers on the advantages of General Electric's *specialized* molding service in defense and industrial production.

Specialized MOLDING SERVICE

. . . FOR BETTER-LOOKING, EASIER-MADE AIR CONDITIONING UNITS

Master Mold Maker: Skilled G-E tool maker "sculptures" a part of one of the largest plastics molds ever made—for molding cabinet for York air conditioner.

Shoots the Breeze: Two-foot G-E-molded plastics grille, delivered to York Corporation complete with adjustable louvers and hardware, saves valuable installation time.

● The unexcelled General Electric facilities for producing large molded plastics parts on a mass-production basis are particularly important to the air conditioning industry.

For example, General Electric recently built a huge 6-ton mold—one of the country's largest—to mass-produce complete cabinets for York window-type air conditioners. General Electric's ability to design and build such large molds gives product designers new freedom in the use of rugged, attractive plastics cabinets and other large plastics parts of economical, one-piece construction.

Also molded for York Corporation by G.E.: a two-foot-long rotary grille for room coolers. To eliminate assembly work, this intricate part is delivered complete with adjustable louvers and hardware—is quickly screw-fastened into position.

G.E.'s plastics molding service is specially equipped to serve industries like these: *Television & Radio, Air Conditioning, Automotive, Refrigerator, Washing Machine, Electrical Apparatus.* For details on *your industry*, write to: Section B-5, Chemical Division, General Electric Company, Pittsfield, Mass.

MOLDED PLASTICS FOR DEFENSE

Government contractors can depend on General Electric's plastics molding service for a great variety of plastics parts. The broad scope of this service is indicated by G-E compression equipment ranging in capacities from 30 to 36 inches; injection equipment that can handle shots of from 1-1/2 to 208 ounces.

You can put your confidence in

GENERAL ELECTRIC